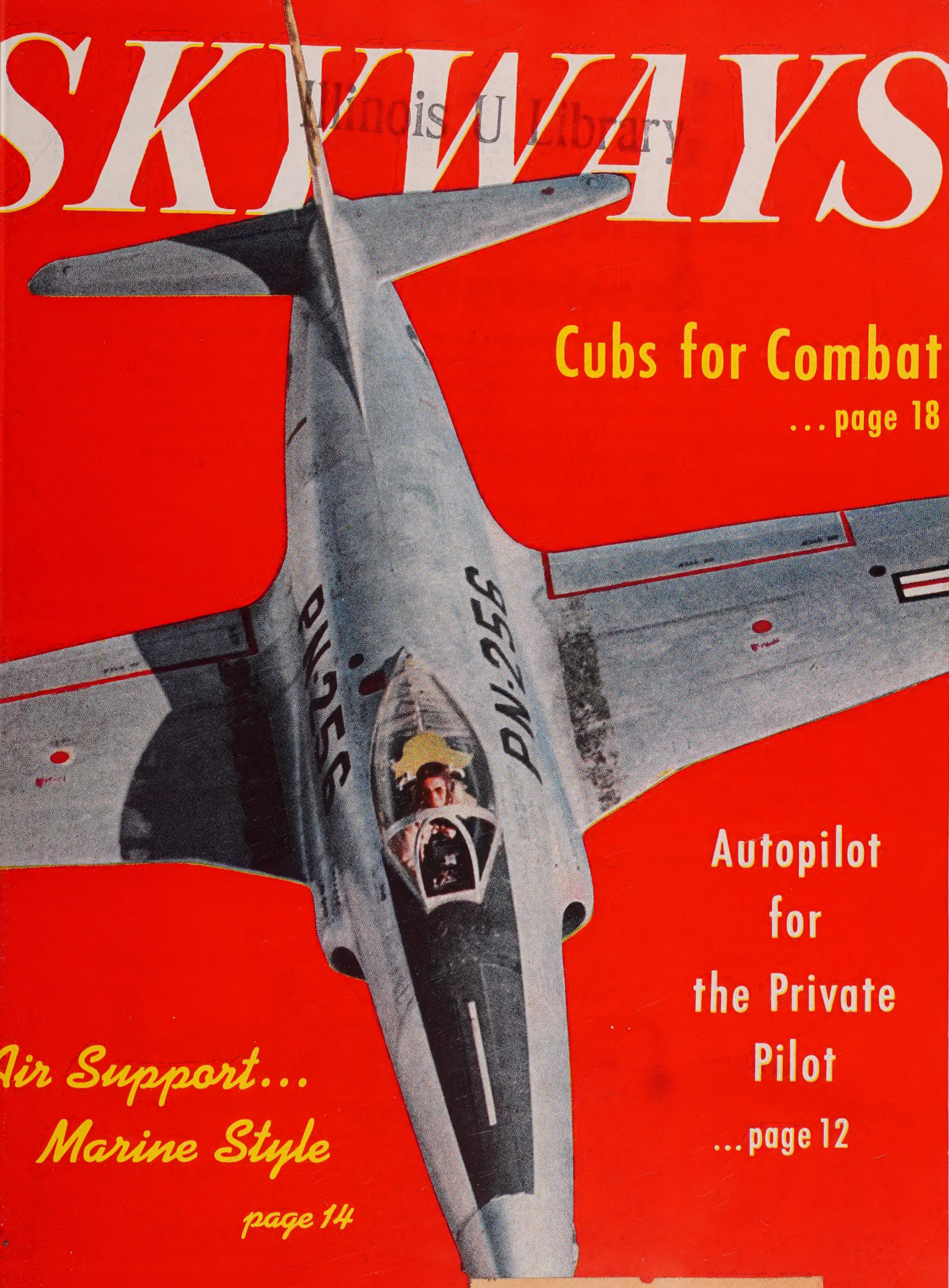
SKYWAYS



Cubs for Combat

... page 18

Autopilot for the Private Pilot

... page 12

Air Support... Marine Style

page 14

951 25¢

Again in '50!

The sales leader in its class

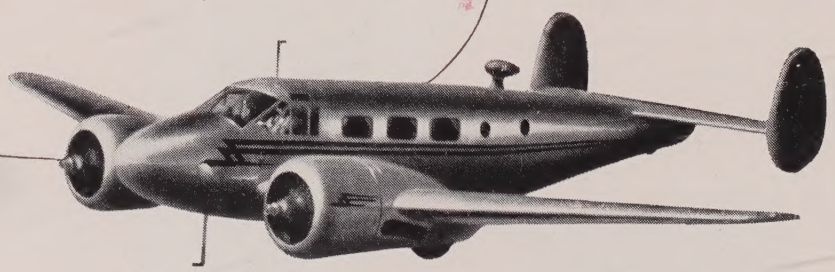
Beechcraft Bonanza

This revolutionary 4-place plane has set records all over the world—for fast, versatile performance, for remarkable operating economy. For comfort—and for *safety*—far beyond CAA standards. So *sales* records, too, have just "come naturally." Today the Model B35 Bonanza is helping to set a new, faster pace in almost every field of American business. For more facts on the Bonanza, contact your Beechcraft distributor today, or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

The Beechcraft Executive Transport

Familiar sight on all the world's airports. This twin-engined Model D18S carries seven to nine in luxurious comfort; cruises at 200 mph. It's the ultimate in air transportation.



Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

PLANE FAX

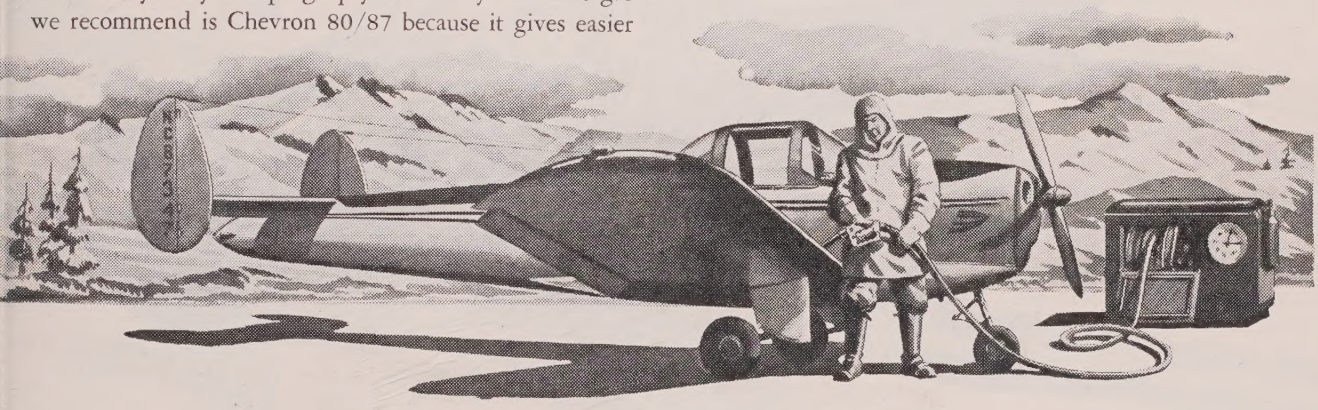
Quick picture of
PROVO MUNICIPAL AIRPORT, UTAH

Utah's longest runways—7000 feet...
Frontier Airlines, distributor for Ercoupe and dealer for Beechcraft, major and minor repairs,
Standard Service.

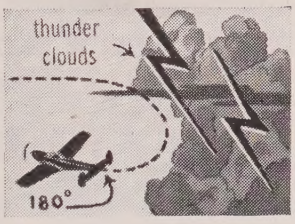
Winter flying tips

Keep ice out of your fuel tank

It's smart to fill up with gas as soon as you land. Otherwise moisture may condense inside your tank, turn to ice next time you fly and plug up your fuel system. The gas we recommend is Chevron 80/87 because it gives easier starts, smoother take-off and no detonation—winter or summer. It permits greater engine power than the old 80 fuel and is more economical than 91/98.



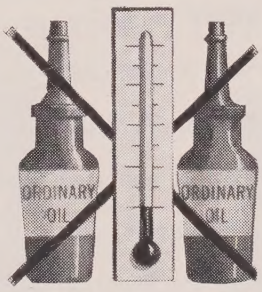
How to handle cold fronts



"Winter thunderstorms move fast and hard, so double-check weather before taking off," advises Merrill Christopherson. "If you hit into a cold front unexpectedly, good rule is to do a 180 and come home or land your plane and tie it up."

Select your oil carefully in cold weather

"When the mercury dips, don't choose an oil by its viscosity alone just to get good circulation! Ordinary oil of light viscosity becomes 'watery' once it's heated, and that costs you plenty. But with RPM Aviation Oil, you have real engine protection. For example, when we majored a Stinson 165 hp Franklin after 1300 hours, we found the shaft had worn less than .0005 of an inch! We credit 'RPM' for the motor's excellent condition." "RPM" is also compounded to get rid of rust and sludge."



SAE 20 SAE 30

Viscosity doesn't mean quality.

TIP OF THE MONTH

How to keep landing gears from freezing

"Don't take off from a wet or slushy runway, flip up your gear and immediately climb upstairs three to four thousand feet where the weather is freezing cold. Chances are your wheels will freeze solid in their wells. Best bet is to fly with your gear *down* for about 20 minutes until they dry off."

Merrill Christopherson, Manager, Provo Flying Service, Inc.

Vol. 10, No. 2, February, 1951, SKYWAYS is published monthly by J. Fred Henry Publications, Inc., 444 Madison Ave., New York 22, N. Y. Printed in U.S.A. Single copy 25 cents. Subscription Prices: U. S., possessions, Canada and Pan-Am. Union $7.00 for three years, $5.00 for two years, $3.00 for one year; all other countries add $1.50 per year for postage. Six weeks required for address changes (give both old and new address.) Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited materials. Reentered as second-class matter April 16, 1948, at the post office at New York, N. Y., under the act of March 3, 1879.

FLY ALL THREE BEFORE YOU BUY!

We Sincerely Believe You'll Choose Navion

THERE'S ONLY ONE WAY TO BE SURE OF GETTING *EVERYTHING* YOU WANT MOST in an airplane...fly all three before you buy! *That's why we ask you to call your Navion dealer today for a demonstration flight.* Settle down behind the wheel yourself. Feel the thrill of the Navion's uncanny ability to virtually "fly itself."

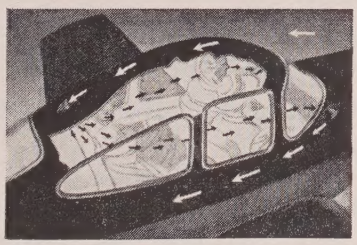
More important, make your own point-by-point comparisons on the complete check list at right. Decide for yourself that the Navion's greater number and better combination of superior features make it a better over-all plane for *you!*

Ryan Navion

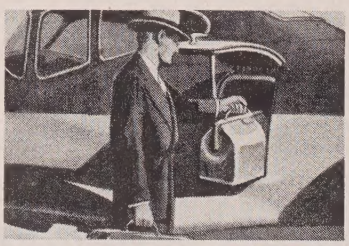
RYAN AERONAUTICAL COMPANY
202 LINDBERGH FIELD, SAN DIEGO, CALIFORNIA

NAVION INVITES COMPARISON!
Check ALL These Points Yourself

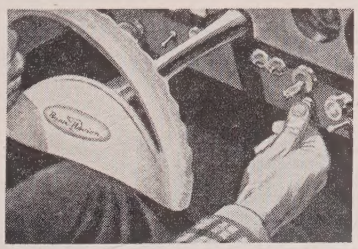
PERFORMANCE	SUPER NAVION	PLANE B	PLANE C
Cruising Speed (full load)	170 m.p.h.		
Rate of Climb (full load)	1250 f.p.m.		
Take-off Run (full load)	400 feet		
Service Ceiling (full load)	18,000 feet		
Range at Maximum Cruise	681 miles		
Fuel Cost	2¢ per mile		
SAFETY			
Slow-Flight Stability	Aileron control below 55 m.p.h. stall		
Landing Roll	470 feet		
Landing Speed	55 m.p.h.		
Lift-Flap Efficiency	43° Deflection—63% more lift		
Visibility	360°—7 Windows		
Power Plant	Lycoming 260 h.p.		
Fuel System	Dual Pumps		
EASY FLYING			
3-Way Stability	Fly "Hands and Feet Off"		
Controls	Exclusive Inter-connected system		
ROOMINESS & COMFORT			
Cabin Dimensions	Width 43" Head Room 38"		
Leg Room	40" to 50"		
Front Seats	Adjust Individually		
Sound Level	None Quieter		
Propeller Noise	Quiet—1765 r.p.m.		
RUGGEDNESS			
All-Metal Heavy Gauge	Yes—.040 to .032 Leading Edge		
Low-Wing	Yes		
Tri-Cycle Gear	Yes—Main Wheels 7.00 x 8		
Steerable Nose-Wheel	Yes—6.00 x 6		
Exterior Finish	Durable Enamel Overall		



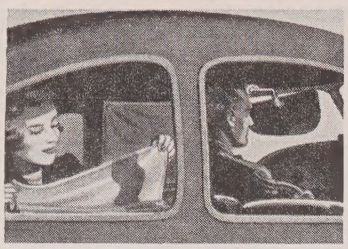
NEW "REVERSE FLOW" VENTILATION SYSTEM sets new standards for fresh, well-circulated air supply. Air comes in rear of cabin, circulates forward and is drawn out front.



LUGGAGE MASTER permits loading and unloading of baggage without entering cabin. And folding rear seat back allows easy access to baggage while the airplane is in flight.



CONVENIENT, NEW PUSH-BUTTON STARTER on instrument panel is now standard, as are the beautiful custom interiors featuring leather trim and even more luxurious seats.



NEW VISORS AND CURTAINS stop glare in cabin. Forward visors adjustable over almost entire windshield. Curtains can be snapped on over side and rear windows or just part of each.

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

SKYWAYS

Cover: Lockheed F-80 *February, 1951*

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FEBRUARY 1951 VOLUME 10, NUMBER 2

J. Fred Henry Publications, Inc. publishes SKYWAYS at 444 Madison Avenue, New York 22, New York. Advertising Offices: 444 Madison Avenue, New York 22, N. Y.; 6 N. Michigan Ave., Chicago 2, Ill.; 816 W. 5th Street, Los Angeles 13, Calif. Gordon Simpson, West Coast Manager. William H. Thomas, Chicago Manager.

The following publications are combined with SKYWAYS: Air News and Flying Sportsman.

AIR YOUR VIEWS

Saucer Sentiments

Gentlemen:

Re: Bob Arentz remarks about the flying saucers. He seems to be trying to prove to himself that he isn't insane. Well, he isn't, but I'm sure he's wrong in trying to bring up something your Gov't is trying to squash.

When, during the last war, Italy came out with its Italian *Caproni* and "castor oil jet," all us pilots laughed. But when Whittle announced his success a short time later, we all smiled and called ourselves "fools."

Let's not be fools like we were there in England, and realize there are ways of obtaining moving energy other than those we now have in production. Propulsion methods now common knowledge weren't so common five years ago. Please give our side some credit for some firsts, not always the enemy.

PETE ESKY

Osborne, Man. Canada

"Our side" has lots of firsts and we give credit for all of them. It's Russia that disclaims our claims.—ED.

Gentlemen:

Last February on Rte 95 north of Needles, California, we had a pair of good field glasses and saw a saucer make a big sweep as described by Bob Arentz. This happened in the mountains to the right of Route 95, and we figured it was experimental country so thought nothing more about it. The full sweep took maybe 10 or 15 seconds. I've seen two different saucers down here.

GEORGE S. CALL

Cartaro, Ariz.

Gentlemen:

Bob Arentz' letter about flying saucers expressed the opinions of a lot of people who have seen saucers and not reported them. In an article recently one magazine traced the saucer reports to New Mexico and Washington which, as you know, are atom bomb station areas. One might deduce that the saucers are made at an aircraft factory in Washington, then are taken to New Mexico where perhaps an atom motor is installed. It could be true. After all, they must have developed something in five years at the atomic aircraft development project! One thing bothers me though. If the saucer was a flying machine of any sort, it would come under the authority of the air force. If so, the pilots in our jet planes and B-36 groups who have seen these saucers would be well aware of their existence. If so, then why are our military pilots so surprised on seeing saucers?

M. BERENZON

Toronto, Ontario

As one turbine engineer put it, "Even when I'm in my cups I can't see saucers," and we still haven't. Frankly, we don't know—ED.

Production Facts

Gentlemen:

Could you tell me whether or not the Ross *Sportplane* is in production and, if it is, is it available in Canada? Also, is the single-place Mooney in production?

D. W. PALYNCHUK

Calder, Sask. Canada

Nothing has been heard of the Ross Sportplane *in a long time and the company that sponsored the design is no longer listed in the aircraft directory. We must assume, therefore, that the company is out of business and the* Sportplane *is not in production. The Mooney single-seater is in production at Mooney's plant in Wichita, Kansas.*—ED.

Maximum Endurance

Gentlemen:

In the November issue you have a picture of a B-25 being loaded with practice bombs for a 30-hour SAC mission. Maximum endurance for a flight TB-25 is about 10 hours.

BOB SHEBAT

Selma, Ala.

Dear Eagle-eye, you have singed our tail feathers . . . and are so right.—ED.

The Lear Automatic Pilot L-2

Progress in aviation is not always achieved at the same even rate. Sometimes it inches along with very little change; other times it picks up speed and travels at a gallop. And on very rare occasions—as now, for example, with the perfection of the Lear L-2 Automatic Pilot an accomplished fact after seven long years of designing, engineering, and testing—aviation suddenly leaps ahead into *an entirely new era* of flight safety and simplicity.

Yet, new as it is, the Lear L-2 Autopilot is by no means untried—by no means merely a promise of things to come. Already installed in Navions, Bonanzas, Cessnas, DC-3's, Lodestars and Twin Beeches, and with many thousands of customer-hours behind it, the L-2 autopilot is today a fully proved, widely accepted, readily purchasable *reality*.

WHAT WILL IT DO? (1) The L-2 will hold your airplane laterally and longitudinally level in fair weather or foul, in turbulent air or smooth, without requiring a finger or foot at the airplane's controls. (2) It will hold your airplane on any course you select and hold it automatically, accurately, and smoothly. (3) It will enable you to alter this course at will in a smoothly coordinated, automatically executed turn. (4) It will automatically maintain your airplane in any desired safe angle of climb or descent. (5) It will automatically maintain your airplane in any desired safe climbing or descending turn.

In other words, the L-2 is both a *stabilizing* and *maneuvering* automatic pilot, operating on all three axes—roll (aileron), pitch (elevator), and yaw (rudder).

NOW LET US TRANSLATE these five basic functions of the Lear L-2 Autopilot into the actualities of everyday flying. What does the automatic flight control of the L-2 mean to you, the private owner or business executive, who depends upon his plane to provide the maximum in safe, efficient, and pleasurable transportation?

It means that all you have to do is turn on the L-2 engage switch and then sit back comfortably for the entire trip, regardless of its length or the weather you encounter, without once touching the airplane controls except for the actual takeoff and landing. (As a matter of fact, the sensitivity of the L-2 is such that it will even take off and land your plane automatically, although it is not designed or recommended for this.) On a long trip the constant muscular effort and nervous strain of manually controlling your plane tax your energy and mental alertness to a considerable, sometimes dangerous, degree. Relieved of this fatiguing burden by the L-2, you will remain physically and mentally relaxed for the brain work that safe flying requires. You will be able to fly many more hours a day than you ever did before and still feel refreshed enough to go about your business when you land.

IT MEANS SMOOTHER FLYING and consequently less airsickness for your passengers and greater comfort for yourself. In rough air the L-2 checks the airplane's rolling, pitching, and yawing movements *before* they develop any appreciable magnitude.

It means that while the L-2 flies your plane, you will be completely free to converse with your passengers; handle your radio communications; write down the weather sequences and winds aloft; make entries in your position log; figure your ETA's; re-plot your course on the chart in case of bad weather; attend to your numerous duties after takeoff and before l
ings; keep a lookout for other traffic,
And it means, furthermore, that you
be able to do all these things leisu
undistractedly, and accurately.

IT MEANS GREATLY INCREASED safety v
you maneuver at low altitude and
airspeed to observe roof markers, c
points, strange fields, runway condit
wind socks, etc. While your attenti
outside the plane, the plane can be ma
vered automatically and safely in pe
turns and constant altitude.

It means greatly increased accura
navigation. Most navigational diffic
are caused not so much by poor calcul
as by the poor steering brought o
compass errors, rough air, restricted
bility, and pilot fatigue. The L-2 will
an accurate course in the roughest

It means that you fly faster and use
gas because you are able to fly straig
because you are able to hold your alti
and maximum cruising speed once
have established them, and because
are able to maintain efficient cons
rate climbs and descents.

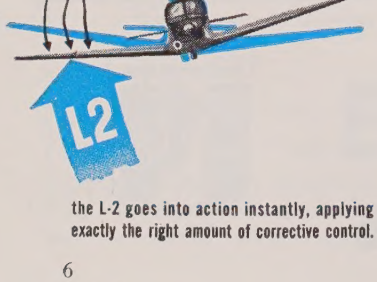
IT MEANS COMPLETELY AUTOMATIC co
when emergencies occur. For exampl
case of engine failure in multi-engine
craft, the L-2 will instantly correct fo
yaw due to unbalanced power and a
matically hold the plane straight and l
An owner of a single-engine airp
equipped with an L-2 Autopilot cl
that it recently saved his airplane by
ing over the flying when an engine
pump failure required his full atte
to pumping gas by hand.

The L-2 can mean the differe
between life and death for the VFR

THE L-2 STABILIZES YOUR PLANE AUTOMATICALLY

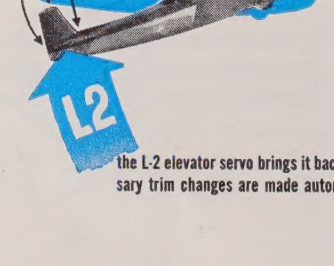
(Amount of deviation shown here has been deliberately exaggerated. In actual practice, the L-2 prevents deviations before they develop.)

When a gust hits and a wing goes down...



the L-2 goes into action instantly, applying exactly the right amount of corrective control.

If for any reason the plane is thrown off the established pitch attitude...



the L-2 elevator servo brings it back. Necessary trim changes are made automatically.

If the plane deviates by even a single degree from the established heading...

the L-2 rudder servo immediately applies a prop
amount of correction, but without lag or ov

s here... and it's great!

tally caught off base in instrument
. Although Lear does not recom-
ntentional instrument flying with
unless you are properly licensed
ipped for such flying, it is a known
t practically every pilot sometimes
o conditions beyond his equipment
ning. However, bad weather makes
fference to the L-2—it flies just as
zero-zero conditions as it does in
A test pilot flying a Bonanza
ed with a Lear L-2 Autopilot delib-
entered a cold-front thunderstorm
ne out on exactly the same heading
t in, although the hail-laden cur-
ithin the storm were so violent that
nt was stripped bare from the lead-
e of his wing. No structural damage occurred, however, because the L-2 kept the plane in a constant attitude—no dives, no high "g" pull-outs.

It means greatly increased peace of mind while flying at night, which can also be treacherous to the non-instrument pilot.

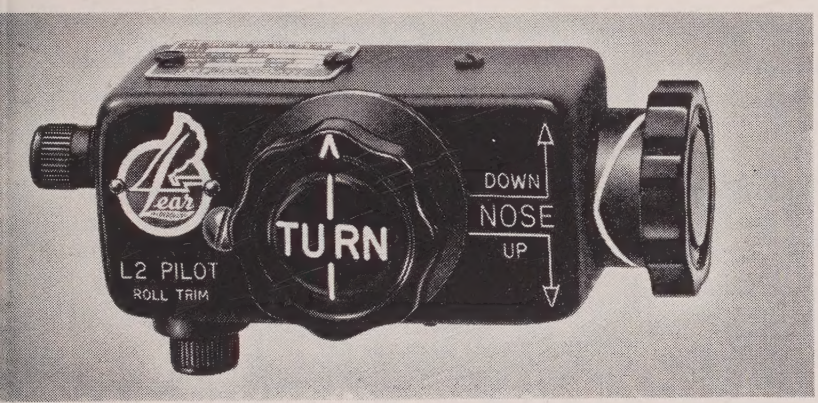
FOR THE QUALIFIED INSTRUMENT PILOT the L-2 has as many advantages as it has for the fair weather pilot. It means, first of all, relief from the strain and hypnosis dangers of prolonged instrument flying. With all due respect to your ability, there isn't a pilot in the world who can do as good a job on the "gauges" as the L-2.

Flying with the L-2 takes most of the grief out of radio range problems, beam bracketing, and ILS approaches. To change course you merely rotate the "Turn" knob on the Controller. Your plane turns smoothly and automatically, and stops turning exactly—but *exactly*—where you want it to stop. To descend, you merely rotate the "Pitch" knob on the Controller for the desired rate of descent, and the L-2 will bring you down from the markers strictly according to the book.

"Holding" over a fix with the L-2 is simplicity itself. You do it just as the airlines do—with a minimum of effort and at exactly the altitude and position at which you are supposed to hold.

THE L-2 IS SIMPLE TO OPERATE, easy to install, and weighs less than 30 pounds (without gyros). The price of the L-2 is $2990, and includes a set of excellent directional and horizon gyros, which replace the ones you normally use for visual reference. The L-2 also contains provisions for adding the Lear Automatic Approach Coupler and the Lear Automatic Altitude Control.

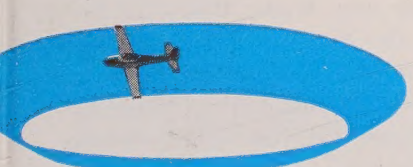
With the Lear L-2 Autopilot in your plane your experience of flying will have no resemblance to anything you have known in the past. You will discover air transportation at its best, its safest, and its most enjoyable. You will certainly want to know more about this remarkable instrument, so we have prepared a comprehensive book entitled *The Lear L-2 Autopilot* which describes its operation and functions in full detail. We invite you to send for your copy today—free, of course.



is unbelievably easy to operate. Turn on the engage switch and your plane is under complete ed control on all three axes! To make a turn, simply rotate the "Turn" knob in the desired n. Stop the turn by moving the knob back to the neutral position. To climb, just roll the knob backward. To descend, roll it forward. The L-2 can be easily overpowered by the nd instantly disengaged by the flip of a fingertip switch on the control wheel. Automatic control keeps the plane constantly in trim on the pitch axis, thus assuring a normal, no-load n on the elevators whenever the L-2 is suddenly disengaged to permit manual flight.

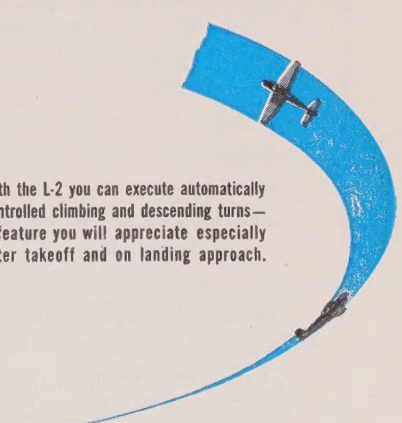
LEAR INCORPORATED
GRAND RAPIDS, MICH.
LOS ANGELES, CALIF. • ELYRIA, OHIO
Export Representatives: Lear International Export Corp., New York, N.Y.
Canadian General Electric Company, Limited, Toronto, Canada

THE L-2 MANEUVERS YOUR PLANE AUTOMATICALLY



u get a smoothly coordinated, constant-bank turn by simply ating the "Turn" knob on the Controller. A great aid to accuracy contact flying—invaluable for instrument and night flying.

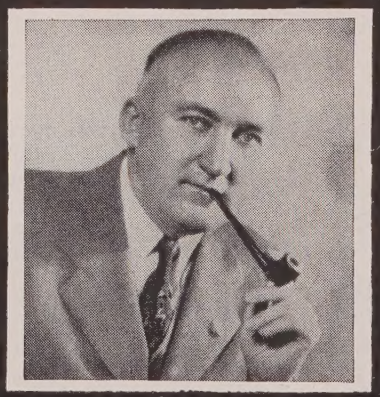
The L-2 will hold your plane automatically in a safe constant-rate climb or descent, at the same time maintaining a fixed heading and a wing-level attitude.



With the L-2 you can execute automatically controlled climbing and descending turns—a feature you will appreciate especially after takeoff and on landing approach.

Walter H. Beech

1891-1950



FOR as long as there is aviation the name "Beech" will be synonymous with good airplanes. And it is with sincere regret that we report the passing of the man who made that synonymity.

Succinctly, the teletype report read:

"Walter Beech, founder and president of Beech Aircraft, died last night at the age of 59. He had been active in aviation for more than 30 years."

Mr. Beech was more than "active" in aviation. He was a leader, a man who helped to build air power not only as a force for the preservation of peace but as a civil aid to the progress of business.

Walter Beech learned to fly in 1914, enlisted in the Air Corps in 1917, and for the next three years served as an Army pilot, flight instructor and engineer, gaining first-hand experience with the major types of military aircraft in service at that time. In 1920, he returned to civilian life as a barnstorming pilot. This enriched his aeronautical knowledge and experience, and gave him ideas for improvements in aircraft design and construction . . . ideas that he did not let lie idle.

In 1923, Mr. Beech took a job with the Swallow Airplane Corp. as designer, test and demonstration pilot. In two years he became general manager.

Eager for complete freedom in putting his plane-design ideas into practice, Walter Beech resigned from Swallow in 1925, and became president and general manager of his own company—Travel Air.

The fame garnered by the Travel Air planes in those early days is probably exceeded only by the fame today of the Beechcrafts. Both cases, testimony to the skill of Walter Beech.

In 1929, Travel Air became the world's largest producer of both monoplane and biplane type commercial aircraft. While Beech and his people were leading the world in output, their products were proving their superiority in almost every air race in America. Louise Thaden set a new U.S. endurance record for women, remaining aloft in her Travel Air for 22 hours and 3 minutes; first place in the National Air Races' Relay Race was won by George Shealy in a Travel Air OX-5; then there was the "Mystery S," a single-place low-wing open racer flown by Doug Davis to first place in a free-for-all closed-course race that was the prototype of the famed Thompson Trophy Race. The Texas Company bought one of these planes in 1930 and its pilot, Capt. Frank Hawks, flew the Travel Air to more than 200 new speed records.

Still wanting to build the finest airplanes in the world, and despite the most drastic economic slump in history, Walter Beech organized the Beech Aircraft Company in April, 1932. His associates were people who had made up the management of Travel Air. Walter Beech's righthand "man" in managerial and financial matters was his wife, the former Olive Ann Mellor who, today, is Secretary-Treasurer of the Beech Aircraft Corporation.

The first Beechcraft biplane made its initial flight in November, 1932, and thereafter followed a succession of race-winning Beechcrafts. The Frank E. Phillips Trophy, emblematic of victory in the Unlimited Race for licensed commercial aircraft, was won by a Beechcraft. In fact, of the five planes that finished in the money, three were Beechcrafts. These results were repeated so often that "It takes a Beechcraft to beat a Beechcraft" became a comment heard wherever planes were racing.

In 1937 Beech Aircraft brought out the famed Twin Beech. This was Walter Beech's bid for leadership in the executive and feederline transport field.

Walter Beech worked long and hard for the day when Beechcraft sales would exceed the million-dollar mark, and in 1938 that goal was reached. His biplane models were dominating the private-owner and commercial market in the 285-to-450-hp class, and the Twin Beech was finding favor with airlines and executive users throughout the world.

The gathering war clouds turned Walter Beech to consideration of military versions of his airplanes. These were as successful as his civil aircraft.

At the close of the war, Walter Beech led his company back into the commercial and private-plane field, and the popular *Bonanza* took its place as another Walter Beech product destined to win as the other Beech airplanes had, just as other Beech planes will continue to win.

Aviation will miss Walter Beech. Industry will always miss a leader. But Walter Beech built so well that Beechcrafts will go on leading the way in aviation, leading the way as did the man who gave his name to good airplanes.—*J. Fred Henry*

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THOMAS K. FINLETTER succeeded W. Stuart Symington as Secretary of Air Force; prior to that he was Chief of ECA mission in U.K. This article is an adaptation of Mr. Finletter's talk at the recent Wings Club dinner in N.Y.

AIR SUPERIORITY requires answers to plane-performance problems. Wing tanks, for example, aided range problem

Responsibility

AIR POWER does not necessarily corrupt if it is accompanied by an equivalent sense of real responsibility

By THOMAS K. FINLETTER

Secretary of Air Force

Air superiority is a deterent to war; Air Power is a guarantee of Peace

I DO not have to try to persuade Americans, who know the story so well, of the importance of air power. But I do think it may be of interest to consider the responsibilities that go with this new and overwhelming power which is in our hands. Power does not necessarily corrupt if it is accompanied by an equivalent sense of responsibility; and it seems to me worth while to ask ourselves what those responsibilities are.

In discussing air power, I shall speak primarily in terms of my own service, the Air Force. I know that nothing I may say will be interpreted as an attempt to minimize the importance—indeed, the indispensability—of the vital roles that must be played by the Army and the Navy. But since I am Secretary of the Air Force, it is that service which I shall mainly discuss.

There is one other point that I want to make at the outset. It is this: In speaking of air power I include within the term both the aircraft of the Air Force and the aircraft of Naval and Marine aviation. In all that I say, I am speaking of the potentialities and responsibilities of total air.

Air power is in a peculiarly fast moving phase.

STRATEGIC air power insures our being able to strike back if we are attacked first. One weapon is the B-36

# of AIR POWER

The invention of the piston-engine flying machine was itself a mutation in applied science and the art of war. Under usual circumstances we would have expected this mutation to have leveled off after a rapid development—just as the automobile and indeed most other applied inventions have. We would have expected a rapid improvement from the days of Kitty Hawk and then intermittent plateaus on which the improvements would have been in detail with a relatively minor increase in performance.

But this is not what happened. Two new mutations came in to increase sensationally the military striking power of aircraft. The power of military air was terrible enough before those two mutations, but with them it became a thing of almost staggering power. I am referring to the jet engine and to atomic weapons.

The jet engine is still in the early stages of its development. Each year, indeed each month, brings new stories of important improvements in existing types of jet motors. Other types of jet-power development are in the offing. Problems of fuel and mechanical efficiency are being overcome and their solution is opening new visions of range, speed, climb, altitude, and performance of the warplane and the commercial plane of the future.

DEVELOPMENT of better fuels, armament as well as aircraft is necessary to the maintenance of U.S. air power

This advance in the airplane, which I think it is right to call a mutation, would be significant enough by itself, but when we add to it the fact that the airplane is the instrument which can carry to its target an even greater (*Continued on page 45*)

BEECH BONANZA equipped with Lear Autopilot was used for demonstration flight. Plane also had *Orienter* and *Omnimatic*

Autopilot for the Private Pilot

Flight shows why pilots are sold on Lear L-2 for private planes

The first gleam in my eye on the subject of this article (the Lear L-2 Autopilot) came just about six years ago. I was talking with an Eighth Air Force *Mustang* escort-fighter pilot who had been assigned to the Operations & Requirements division of the Air Staff in Washington. We were discussing the new long-range version of the *Thunderbolt* (P-47N) with its better than 2,000-mile range, and at that time about to be headed for the Pacific. "You know," he said, "that's a heck of a long range for one pilot in a single-seater. Even after 1,000 miles you sure know you've been sitting down when you get back! One thing, though, is going to be a terrific help in the P-47N if they can get it in time—that's the new lightweight autopilot called the C-2 which Bill Lear has been playing around with. A couple of friends of mine have been on some test runs with it and they say it holds as steady as a ship. Some day they'll get it for private planes, and it's going to make a whale of a difference."

Well, that day is here. We've got it, and that fighter pilot knew what he was talking about.

My first real grasp of autopilot philosophy, however, came on the day I talked with Glen Nesbitt and Joe Lyman of Sperry out at MacArthur Field, and then watched a practically automatic approach and landing in one of the Sperry experimental C-47's. It was really uncanny to watch those controls work with nobody touching them. When they told me that because its reactions were so much quicker, an autopilot could fly an airplane much more smoothly than the most experienced human pilot, I was quite prepared to believe them.

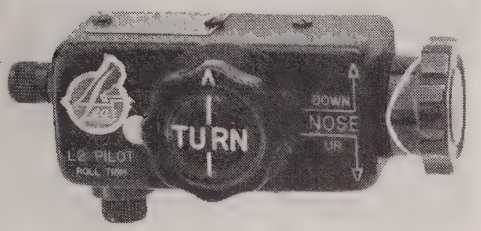
So with this background I looked forward to the test flight in the Lear *Bonanza* equipped with the L-2 autpilot. I met Norman Warren at Butler's hangar at Washington National on one of those Indian summer days we had in the fall. He had flown from Los Angeles to Grand Rapids with Bill Lear, then on to Washington to demonstrate the L-2 to several people there. One of these people was Frank Cornish, chief pilot of the Twin Coach Company, Kent, Ohio, which operates a company-owned Twin Beech and *Bonanza*, with the president operating another *Bonanza* of his own. This particular deal had just been made by phone before I arrived and, as Frank had other things to do that afternoon, I suggested that he take a half-hour flight in the Lear *Bonanza* on my time, as I could easily wait.

It actually was nearer a full hour but it was well worth it all around. First of all, the *Bonanza* was also equipped with the Lear ADF-12 *Orienter* and *Omnimatic* as well as the Autopilot, and Frank, who is an excellent pilot, had a lot of fun with all of them, besides making a simulated ILS approach at DCA, using the Lear CVIX Cross-Pointer Indicator. with the autopilot. At the end of the demonstration ride, Frank said that his company would probably place an order for two *Omnimatics* for the *Bonanza* and an L-2 *Autopilot* for the Twin Beech.

From my point of view I was glad to get Frank's comments on the whole deal before taking my own flight. He said the L-2 was all that had been claimed for it, and more; that he had put it through its paces and was thoroughly sold on it.

I then took my seat in the co-pilot's position and Norm ran over the Lear equipment on the dashboard quickly. (You can follow it on the photo below). Upper left-hand (*Continued on page 37*)

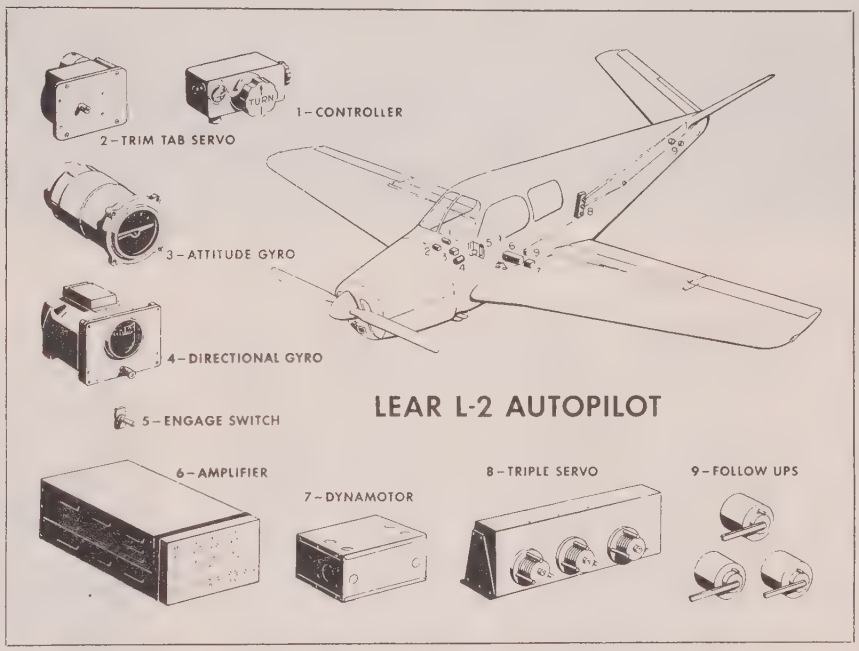
By COL. N. F. SILSBEE

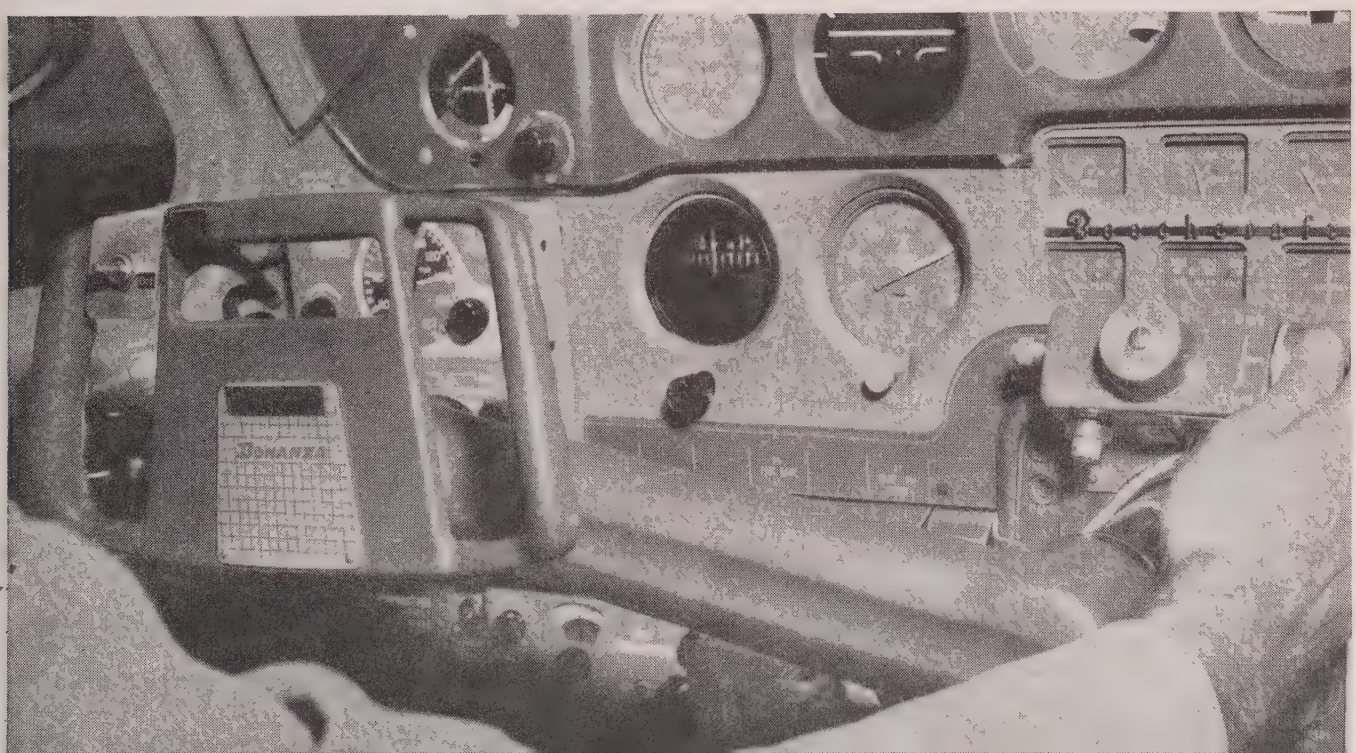


CONTROLLER *(above)* is operation heart of L-2. To make turn, pilot rotates "Turn" knob in desired direction. He stops turn by returning knob to neutral

DIAGRAM drawing of the Lear Autopilot *(right)* shows components that make up the entire system. The L-2 is both a stabilizing and maneuvering automatic pilot operating on all three axes: roll (aileron), pitch (elevator) and yaw (rudder). Note the nine components

PANEL photo of *Bonanza* shows L-2 setup. Engage switch is on control wheel; Attitude gyro is above the altimeter; Directional gyro is left of altimeter





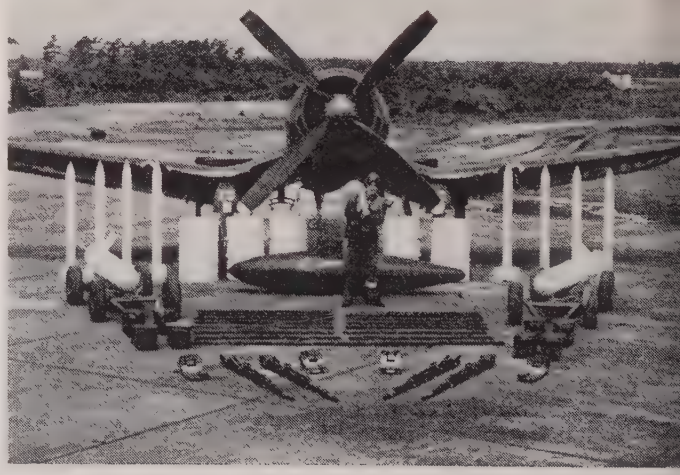
Air Support . . . Marine Style

MARINE Lieut. J. V. Hanes brought his disabled *Corsair* into Kimpo Airfield while ground fight for field was still going on

By T/SGT. EDDIE E. EVANS, USMC

IN REPORTING on a mission of close air support for United Nations troops fighting in Korea, an aviator of the Armed Forces of the United States reported that: "When I pulled out of the dive, I was surprised to see that one of our tanks was less than 200 feet from my fire point. The Reds were so close to our boys that I first made four dummy runs in order to line up the target properly." Was the flyer a madman . . . or lunatic who was bent on destroying United Nations troops? Neither, he was Major William H. Lundin, USMC, a Marine Corps pilot so thoroughly trained in close air support for ground troops that he could pin-point ground targets as they were designated by the infantry.

How about the men on the ground, how do they feel about such close air support? Do they feel a bit dubious about an aviator bombing and strafing so close to the front lines? The answer to all is, "Absolutely not." The Marines on the ground are accustomed to seeing the gull-winged *Corsair* fighter planes diving at targets a scant few hundred yards or feet in front of them and destroying enemy tanks, artillery positions, installations and troops. To them this support is a part of their tactics and they are confident that Marine airmen can and will destroy the enemy without doing them harm. And this support is not limited to Marine ground units. During the course of the Korean campaign, Marine Corps aviators have given U. S. Army, British and South Korean units the same effective close air support.



STAR PERFORMER for Marines in Korea has been F4U-5, shown above with payload of destruction Marines toss at foe

When General Douglas MacArthur, United Nations Commander in Korea, called for all the Marine Corps aviation available for service, he was not calling on an organization and technique that had been developed recently, but one that had been perfected over the past 30 years. The General knew Marine Corps aviation and its capabilities, for he

CLOSE SUPPORT is a fact between Marine ground forces and air arm. Here *Corsairs* cover Leathernecks landing on beach

had used it effectively during many Pacific campaigns in World War II. High-ranking Army officers under General MacArthur witnessed Marine aviation in action in the Pacific and put the stamp of approval on what they saw.

Lieutenant General Eichelberger, of the 8th Army, said that: "The value of close air support for ground troops as provided by Marine flyers cannot be measured in words and there is not enough that can be said for their aerial barrages that have cut a path for the infantry." To this Major General Patrick, of the 6th Infantry Division, added: "In one strike made 28 February against Mt. Mataba, these Marine pilots dive-bombed a pin-pointed target located between two friendly forces with an accuracy comparable to that obtained by field artillery." The story behind the development of an organization that can garnish such praise from high-ranking officers of another service is almost a duplicate of the history of Marine Corps aviation.

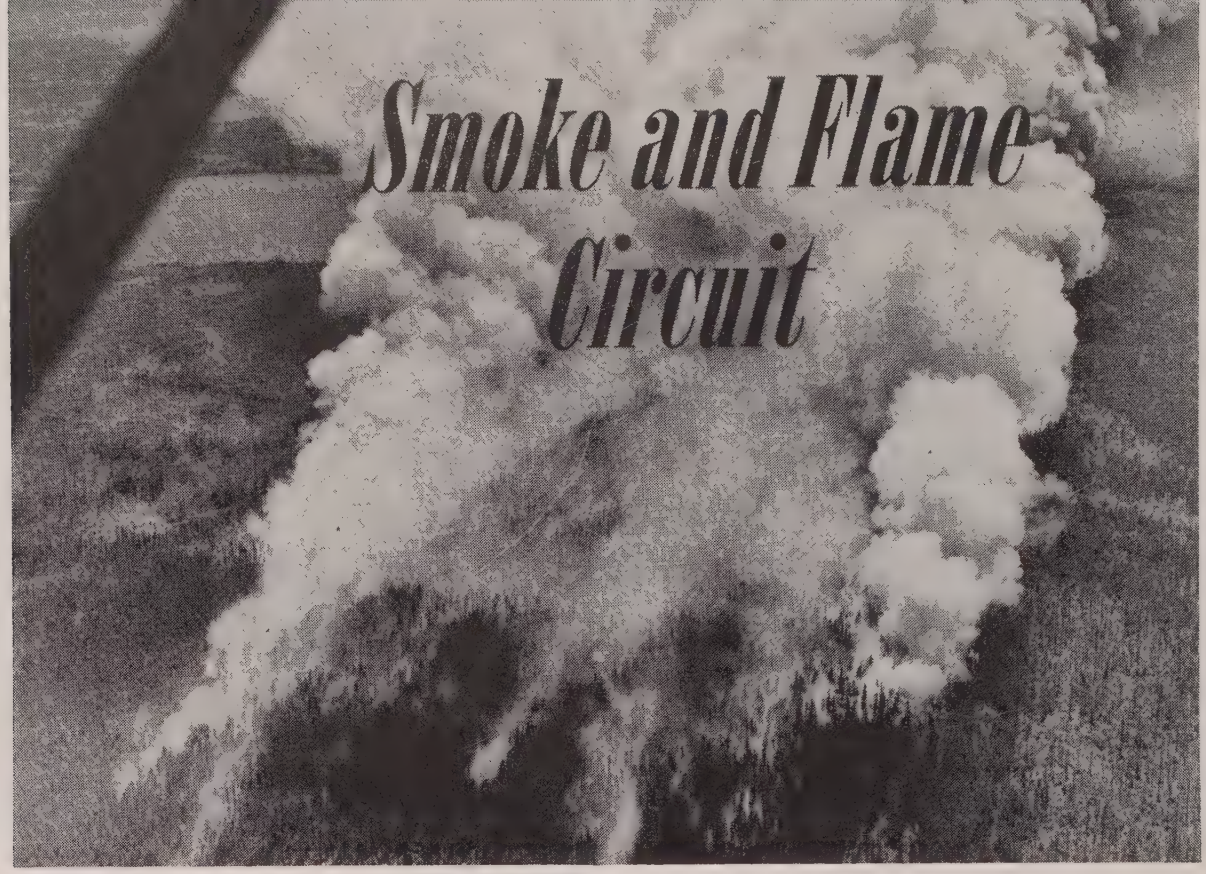
MARINE Lieut. Klingman (on wing) downed bomber with prop when guns froze; saved ground troops from bombing

Refusing to accept the once-popular doctrine that close air support is an unprofitable and wrong undertaking for an air force, Marine Corps pilots began experiments in Haiti in 1919. This experimenting led to the present-day technique of dive bombing. Later, when the Second Marine Brigade was operating against the dissident forces of Sandino in Nicaragua, the new art of dive bombing and strafing was used with exceptionally good results. It was there that the first aircraft strikes were directly controlled by the man on the ground.

During the period between the two World Wars, when amphibious warfare was being developed further by the Marine Corps, Marine aviation was being trained in the concept of tactical air as a member of the team. While other air arms were struggling to sever their connections with parent services, Marine Corps aviation was being knitted closer to the ground forces of the Corps. Practically all Marine aviators started their careers as ground Marines, and served in units of the Fleet Marine Force before they were assigned to flight training.

Marine aviators and ground Marines lived in the same barracks, ate at the (*Continued on page 38*)

Smoke and Flame Circuit



SMOKE JUMPERS went into operation in 1940 with 10 men. Last year 244 jumpers dropped on 94 fires. Note reflection of jumper's hand in plane window *(above)*. Minnesota-based forest-fire patrol operates *Norseman (below)* out of Ely

FOREST-FIRE damage has been reduced materially, thanks to today's quick reporting, plus airborne fire-fighting tactics

State forest agencies, private firms use planes to watch-dog timber land

By C. S. PRESTON

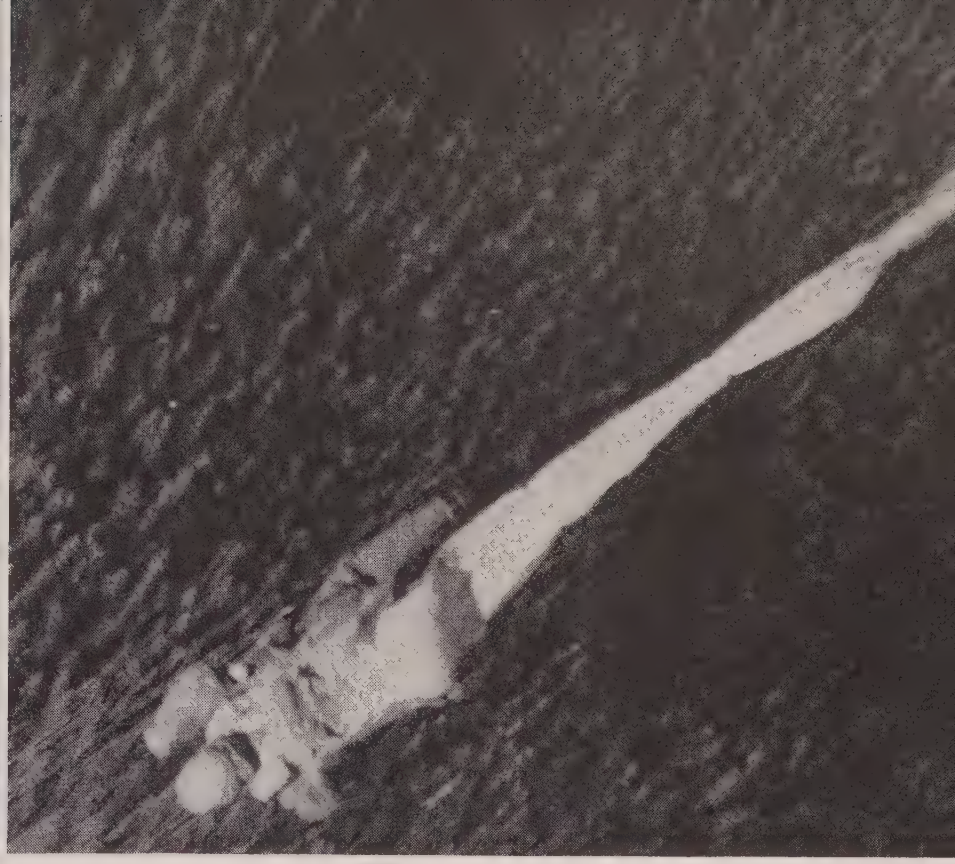
American Forest Products Industries

ALONE helicopter punched its way up through billowing clouds of smoke along the steep edge of narrow Castaic Canyon, 44 miles outside Los Angeles. Below, scorching up the dry cactus and chaparral side of the sandy cut, flames of a raging forest fire reached for the tossing, bubble-nosed craft. Heat drafts pitched it up and away like a kite. But each time, it ground down closer to the fire, just out of reach of the licking flames. Up one side of the arroyo it went, then down the other on both sides of the fire line. After an hour it headed back to the fire camp a few miles away.

Army pilot Jim Chuders, and George Reynolds, Angeles National Forest engineer, climbed out and silently handed the "fire boss" a rough-sketch map of the area they'd just covered. Then they grabbed sandwiches from the mobile Red Cross emergency kitchen and headed back to the canyon for another trip of reconnaissance.

That was the first use of a helicopter for forest fire patrol—September 10, 1946.

MICHIGAN Conservation Dept. uses Stinson *Voyager* for fire patrol



PARACHUTIST pulls ripcord when he has dropped 15 feet below plane. Note canopy unfolding from smoke jumper's back pack; the ripcord in his fist

No one knows when the first conventional airplane was used for forest-patrol work. Some estimates put it back to a date a little after the first World War. Be that as it may, planes have been so extensively used for this work in recent years that airborne fire patrol is fast becoming the most important forest-protection weapon in America in the eyes of the nation's forest industries.

Out in the west, where vast areas of timber are almost inaccessible and fire towers may be miles from each other, the airplane is both fire engine and timber-taxi. Equipped with radio, it can relay instructions and up-to-the-second data faster and more efficiently than has been possible ever before. It can accurately spot-drop supplies to ground fire crews hours or even days before those same supplies could be trekked in overland. Planes drop parachutists, too, flying crews to high danger spots to attack a fire before it sweeps out of control.

In the Castaic Canyon fire, Ranger Ray McCormick, the "fire boss," reported the use of the helicopter cut fire damage in half. The fire actually burned over more than 4,000 acres of land. Without the flying eggbeater, however, the damaged area might have been twice that.

Planes long have been used to fight fires. Private firms and state forest agencies in the Pacific Northwest have developed their use to such a great extent for flying over rugged, timbered, almost trackless mountains that management of 96 per cent of forest lands throughout the west is rated "fair" or better by the U. S. Forest Service.

In Washington and Oregon, the combination of quick reporting of fires and high-speed airborne fire-fighting tactics has helped reduce fire damage immensely. In 1939, an average of 61.3 acres of timber was burned over in every fire in Washington; for Oregon, the figure was 152.7. In 1944, Washington's figure was 41.0 and Oregon's down to 16.8. In 1948, the average Washington forest fire burned over less than 10 acres. In Oregon the figure was four. This means that in 10 years the average number of acres burned per fire has been reduced in Washington to one-sixth and in Oregon to one-fortieth!

In Alabama, where the terrain is flat instead of mountainous, forest industries bought a plane for the state forest service to spot fires on bleak, hazy days when visibility from fire towers is cut to a mile or less. The same is true in the Southern Appalachians of North and South Carolina, and over the lake-studded regions of New England and the Minnesota-Canadian border country. In all of these areas, planes are doing a tremendous fire-spotting job.

Across the nation, forest industries, recognizing their vital stake in vast stretches of American timber, cooperate wholeheartedly with the public forest agencies to provide timber-hopping aerial patrol during fire season. The (*Continued on page 43*)

CUBS for COMBAT

By LIEUT. B. R. LAWLER

THE roar and mighty smash of bombs may be the keynote of World War III, but it is most likely that the final decision will take place in the fierce combat of ground armies. If the Number III conflict does occur, there is no doubt that Army aircraft will undertake the same duties as in World War II.

This future clash will find the familiar "grasshopper" of the last war in its role of artillery observer, plus the addition of something new. In August of 1945, in response to popular demand, the Army assigned lightplanes to some other branches. During the war, the Artillery was deluged from every direction with requests to borrow planes. These planes were recognized as valuable to both combatant and non-combatant groups, and so were assigned to all sorts of units.

The war ended before any combat evaluations of this arrangement could be gained. Guesswork, conjecture, and pious wishes point toward the success of these new dispositions. Postwar maneuvers have proved, as far as they go, that the Army's faith in this new weapon is justified.

General Mark W. Clark, Chief of Army Field Forces, says, "Army aircraft have had my interest and support since their introduction nine years ago. In North Africa, where they were employed for combat artillery observation the first time, I noted the advantages to be obtained through their use and was particularly impressed by their great versatility. When I was commanding the Fifth Army in Italy, we pioneered their uses as 'Horseflies.' During the advance beyond Rome, our leading divisions were preceded by these brilliantly painted aircraft which led fighters to targets in our line of attack.

"Such employment of lightplanes pays rich dividends. Recently, on the battlefields of Korea, it was reported that one of our "Cubs" discovered six enemy tanks refueling beside a road. The pilot left the scene quickly, but soon returned with some friends—in this case, four Australian fighter planes. The destruction of those tanks, even before they had a chance to attack, proves once again, that our faith in Army aircraft is more than justified.

"We of the Army realize that new weapons must be constantly developed but we are also careful to see that improving the efficiency of the old ones is constantly receiving attention. In such a manner did the use of aircraft increase substantially the accuracy and deadliness of one of the primary arms of warfare—the artillery. Now, these planes are to be employed in a similar manner to assist the other combat arms of the service.

MIGHTY MOUSE of the Air Force, a military version of Piper *Cub*, demonstrates cooperation of Air and Ground Forces at front lines in combat

"These products of America's superb industrial know-how have and will continue to contribute greatly to the success of the combined arms team."

The "grasshopper" has been used for observation by unit commanders or members of his staff, for column control, for camouflage checking, to carry essential parts and supplies to isolated units, for local courier work, emergency evacuation of wounded, to photograph enemy installations when Air Force planes are not available, emergency wire-laying, and dozens of jobs where speed and clear observation are necessary.

To see just how this will work, let's take a trip to the battlefield of the future, complete with blasting rockets, and age-old infantry combat. The artillery will be directed from improved "Cub" types, with possible addition of some armor. The light-metals industry has several promising possibilities along those lines.

On the whole, however, it is not likely that there will be any radical change in plane design. Due to the short and unimproved landing fields available near the front, this type aircraft must be kept light and maneuverable. The need of evasive action to avoid anti-aircraft and fighters must also be kept in mind.

What of the helicopter? Very few will probably be seen above the battlefield. Today the price is high, the payload low, but the future will bring improvements. The thing that prohibits use of helicopters in combat is their vulnerability to fighters. When a pilot attempts to dodge and weave, as in a "Cub," he signals his intentions to the attacking fighter by the slant of his rotar disk. The ideal observation plane would be one combining the features of the lightplane and the helicopter. This "heliplane" would have propellors and rotors, or have huge props that could somehow be shifted to a near-zero landing speed. This ideal is probably a good distance in the future.

Yet, for rescue or in rugged terrain where landing strips are scarce and in the rear echelons, the helicopter will be supreme. In the Arctic, especially, it has shown itself to be invaluable. Instrument flying in all climates still presents difficulties, but a satisfactory solution is not too far away.

Let's place an enemy column on the Alcan Highway, rushing southward from Alaska. It is composed of numerous tank units, mechanized infantry, and very heavy air cover.

An American general, commanding the forces that have been (*Continued on page 38*)

TARGET spotting is just one of "grasshopper's" combat jobs. This *Cub* has just taken off for target maneuvers

KOREAN war proved the helicopter's value as air rescue aircraft. Here litter bearers carry soldier to hovering 'copter

U.S. ARMY liaison mainstay is this military version of the Ryan *Navion*

SWISS-AMERICAN program calls for mutual training of young flyers. This past summer five CAP cadets spent a month in Switzerland learning to fly gliders. The lucky Civil Air Patrol cadets who made trip were *(left, top to bottom)* Galen Griffee, Glenn Tucker, Ronald Hauck, Savery Stuckey, James Stockwell

Cadets in Gliders

Exchange program sends Civil Air Patrol cadets to Switzerland for glider instructions

SOARING was done over rugged mountainous terrain around Gstaad-Saanen, well-known gliding site

DURING the war, after the USAF had accidentally bombed the Swiss cities of Schaffhausen and Zurich, General Carl Spaatz, then USAFE commander, went to Switzerland personally to offer apologies. The gesture created a lot of good will among the Alp dwellers for American airmen in general and for Tooey Spaatz in particular. When he retired, the general maintained contact with his friends in the Swiss government and last year he succeeded in drawing their country into a sort of "Little Atlantic Pact" for mutual training of young flyers.

Under this program 70 cadets of Tooey Spaatz' Civil Air Patrol are sent abroad each year to study the flying techniques of other nations. In exchange an equal number of flyers from France, Britain, Italy, Portugal, Canada—and now Switzerland—come to the United States. The exchange with Switzerland is especially valuable to the American cadets because the Swiss, along with the Swedes, now lead the world in the use of gliders for the training of young pilots.

This past summer five American CAP cadets spent a month in Switzerland learning to fly gliders. They were accompanied by Lieutenant Colonel Joe Dyer of Orlando, Florida, a wartime test pilot and now one of the motivators of the CAP cadet training program, and by Captain Ernie Wilkowski of Reno, Nevada, Air Force liaison officer. The two officers also went through the glider training course.

"Flying gliders is very different from flying powered aircraft," Captain Wilkowski explained. "It is primarily a sport, but it also provides invaluable training for regular flyers. You learn things about aerodynamics in one of those sailplanes that can't be learned in any other way."

In the years between the two wars gliding was a popular sport in Germany and a great many *Luftwaffe* pilots were recruited from among the members of German glider clubs. The sport is prohibited in Germany now. Switzerland, however, has a host of active clubs and about 1,000 licensed glider pilots who have reached a high degree of skill both in the construction of this type of aircraft and in flying them. The gliders placed at the disposal of the Americans were plywood and fabric jobs of the most advanced type, weighing from 400 to 600 pounds and costing up to $3,000.

Although the exchange program is limited in its scope, American Civil Air Patrol officials feel that it may serve to further develop gliding as a sport in this country. All of the youths who participated came back highly enthusiastic about gliding, and filled with plans to organize glider clubs in their own communities.

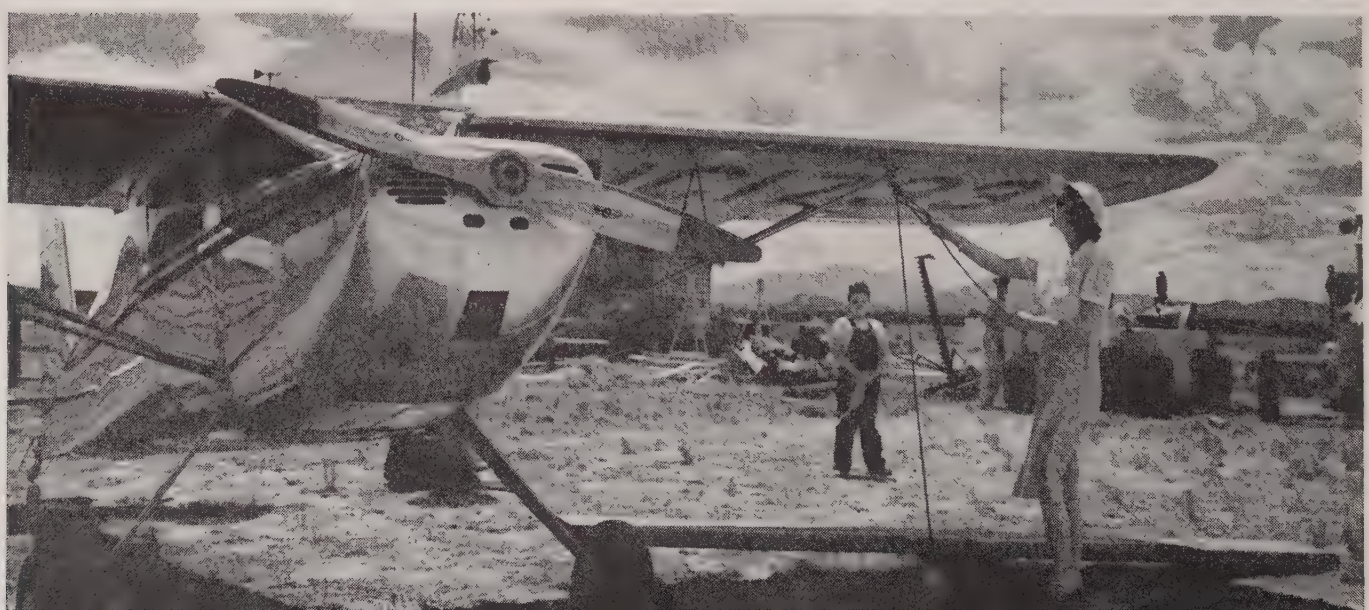
The cadets in this summer's group were selected by their fellow members (*Continued on page 53*)

CADET fastens tow rope to glider as Instructor Gehriger *(in cap)* and Jim Stockwell *(rear)* get set to go aloft

EXECUTIVE AIRCRAFT such as Weatherhead's *Lodestar (above)* range in price from $30,000 to over $100,000 depending on appointments, etc. Medium-class business plane would be $10,000 to $15,000 Cessna 195, *Bonanza* or *Navion*

PROFIT *by Plane*

LIGHTPLANES such as Cessna 140 *(below)* and others in the $2500 to $3500 class are good for farm and ranch use



ADMA Report points up plane facts for all prospective plane buyers

Not too many years ago owning and flying your own airplane was considered a sport, an expensive sport primarily limited to those whose incomes were considered "top bracket." A few companies and corporations owned and operated aircraft but that operation, too, was considered costly, with the balance of value tipped in favor of the plane mainly by the extra prestige it offered.

In recent years, however, that picture has changed. Today, the privately owned airplane is a business necessity, both to the individual and the company. Whether the airplane is a *Cub*, a Bonanza, a Cessna 195, a multi-engine Beech or Douglas, its utility has been so increased

TANDEM TRAINERS like this Piper *Cub* on floats is a good low-priced plane for pleasure trips for a beginner flyer

as to make it an essential tool of industry.

The "ocean of air" touches everywhere, and this basic fact makes air travel the fastest, most convenient and often least expensive method of traveling. A privately owned airplane draws a straight line from where you are to where you want to go, and it gets you there in the least time.

Today there are tens of thousands of personal and company-owned planes being used daily for business, farm or family use. Faster, more useful and easier-to-fly aircraft are on the market at lower cost, and hundreds of new airports have been added for greater convenience. In addition, new and simplified navigation systems and airway facilities are in operation. All of this has done much to make private aviation practical.

As a private conveyance, the airplane is as far ahead of the automobile as the automobile is ahead of the horse. To the businessman who must do a great deal of traveling, flying means doubling or even tripling his efficiency and capacity. A 100-mile trip by car takes more time and effort than a 200- or 500-mile trip by personal plane. In fact, many a salesman today finds he can make three calls in three different cities and still be home with his family in the evening.

Contributing factor to the utility of the airplane is the fact that it can fly a straight line and is not limited to traversing narrow highways. On an average, you can figure the air distance between points to be from 15 to 20 per cent less than the surface distance. Add to that shorter distance the greater speed afforded by a plane and you can see the time-profit in personal-plane travel.

The company-owned plane, like the personal plane, has added utility. In 1948 there were 6,471 corporation-owned aircraft of four-or-more-passenger capacity. At the end of 1949, this number had grown to over 8,000. In addition, there are many thousands of two-passenger utility planes used for industrial purposes.

Multi-million dollar corporations are not the only firms profitably using executive aircraft. Hundreds of relatively small firms have found economy in the operation of their own aircraft. Not only is travel time substantially reduced but a greater area can be covered without having to increase the size of the sales staff. Also, the plane improves customer service and prevents production delays by speeding essential supplies or replacement parts to the places where they are needed. All in all, the company plane enables a firm to broaden its horizons, to increase its scope and field of operation.

A paint manufacturer, Randolph Products Co., of Carlstadt, N. J., has used a company plane since 1937. When queried, W. G. Randolph, president of the company, reported: "The ability to cover more territory more quickly by plane for sales and service has been a substantial factor in expanding our business. I am certain there are tens of thousands of businesses of all types and sizes that could profitably use a company-owned airplane as we do."

The time-profit in owning and operating a plane is demonstrated by the Stone and Falls Construction Company, of Ada, Okla. This company uses a plane to keep tabs on its construction jobs in Oklahoma, Texas and other points. A typical trip was one made recently from Ada to Chicago in 4 hours and 35 minutes. By car that trip would have taken 2 days and 20 hours.

From a dollars and cents point of view, John S.

Nolan, president of the Nolan Finance Company, Washington, D. C., reports that he averages 18 miles to the gallon in his four-place plane. Says Mr. Nolan of his airplane, "This economy of operation plus reduced travel time means our company can save up to $100 when we fly our auto insurance adjuster to settle our out-of-town claims."

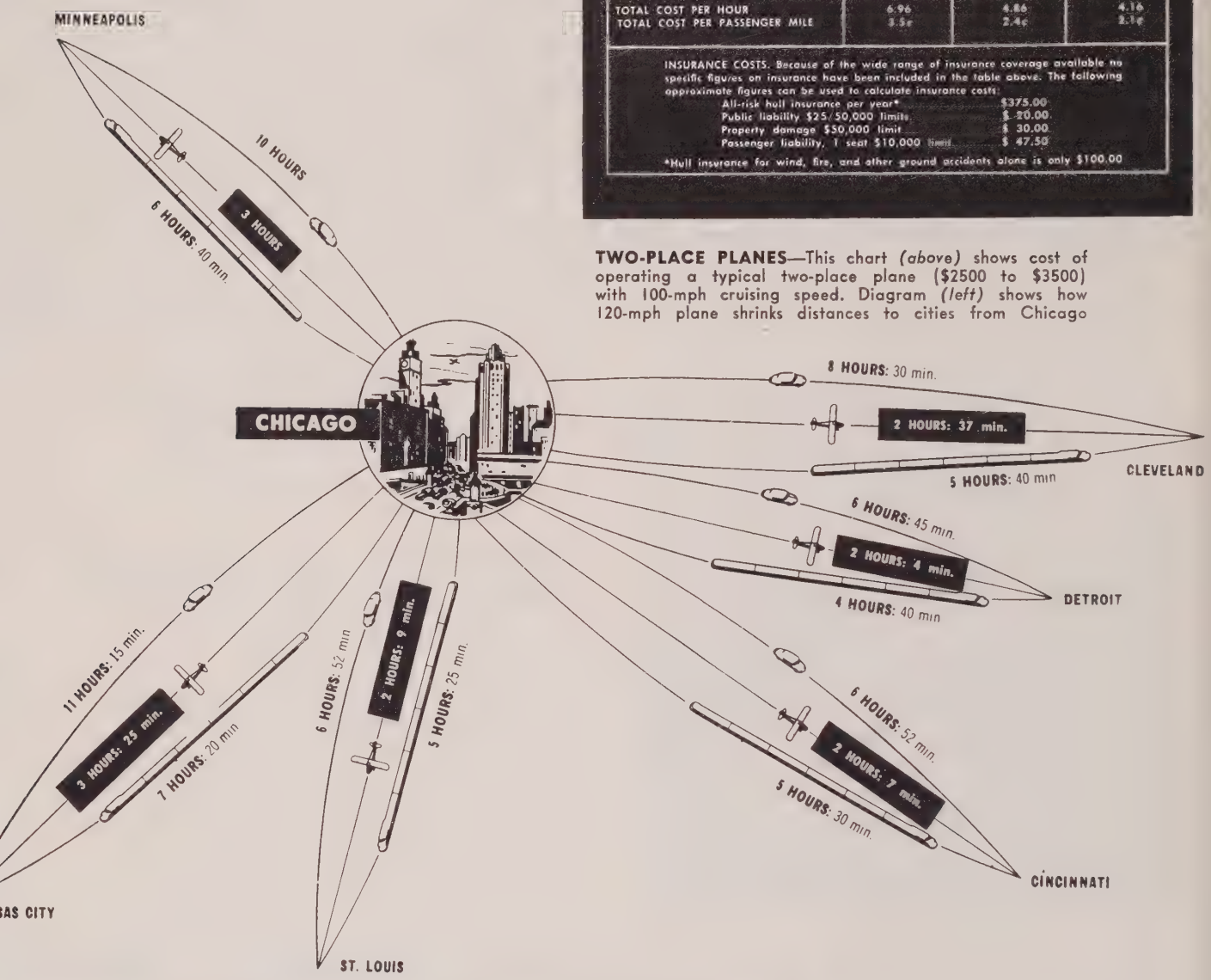
ANNUAL USE	200 HOURS 20,000 MILES	400 HOURS 40,000 MILES	600 HOURS 60,000 MILES
Gasoline and oil—5 gals. @ 30 plus ½ pint of oil per hour	$1.70	$1.70	$1.70
Inspection and Maintenance on Aircraft —100 hour checks @ $35—25 hour checks @ $5 plus parts, cleaning, etc.	.60	.60	.60
Engine Overhaul—$350 @ 600 hr.	.46	.46	.46
TOTAL DIRECT OPERATING COST PER HR.	2.76	2.76	2.76
Depreciation (5 yr. amortization) $600 per year	3.00	1.50	1.00
Storage @ average of $20 per month	1.20	.60	.40
TOTAL COST PER HOUR TOTAL COST PER PASSENGER MILE	6.96 3.5¢	4.86 2.4¢	4.16 2.1¢

INSURANCE COSTS. Because of the wide range of insurance coverage available no specific figures on insurance have been included in the table above. The following approximate figures can be used to calculate insurance costs:

All-risk hull insurance per year*	$375.00
Public liability $25/50,000 limits	$ 20.00
Property damage $50,000 limit	$ 30.00
Passenger liability, 1 seat $10,000 limit	$ 47.50

*Hull insurance for wind, fire, and other ground accidents alone is only $100.00

TWO-PLACE PLANES—This chart *(above)* shows cost of operating a typical two-place plane ($2500 to $3500) with 100-mph cruising speed. Diagram *(left)* shows how 120-mph plane shrinks distances to cities from Chicago



	170 MPH AIRPLANE	AUTOMOBILE	RAILWAY	AIR LINE
Lv. San Francisco (City) Arr. Sun Valley (Resort)	Fri. Noon Late Fri. Afternoon	Fri. Noon Sat. Evening	Late Fri. Afternoon Early Sun. Morning	Early Fri. Afternoon Early Sat. Morning
Lv. Sun Valley (Resort) Arr. San Francisco (City)	Mon. Morning Mon. Noon	Late Sun. Afternoon Late Mon. Night	Late Sun. Night Tues. Morning	Late Sun. Night Early Mon. Afternoon
Total Time in Transit (round trip)	10½ hours	44½ hours	69½ hours	28½ hours
Total Time at Sun Valley	2 Days & 3 Nights (62 Hours)	One Day & Night (22 Hours)	One Day & Evening (18½ Hours)	2 Day & 1 Night (30½ Hours)
Miles Traveled	1,180	1,546	2,186	1,454
Total Transportation Cost for Four	$109.03	$136.05	$369.48	$420.28
Total Cost of Gasoline and Oil	$23.20	$28.20		

TABLE *(left)* gives an interesting comparison between cost of four people making typical week-end trip by car, train, airline or 170-mph personal plane from San Francisco to Sun Valley, Idaho, and return. Under "Airline" it was necessary for travelers to use railway from Boise and Sun Valley. Also, railway fares include first-class ticket and lower berth, plus federal tax. Auto costs are based on $0.088 per mile; airplane costs on 300 hours use per year, $.09 per mile; all costs included

ANNUAL USE	200 HOURS 25,000 MILES	400 HOURS 50,000 MILES	600 HOURS 75,000 MILES
Gasoline and oil—8 gals. @ 30¢ plus ½ pt. oil per hour	$2.60	$2.60	$2.60
Inspection and maintenance on aircraft, cleaning, etc.	75	75	75
Engine overhaul and parts $450 @ 600 hr.	75	75	75
TOTAL DIRECT OPERATING COST	4.10	4.10	4.10
Depreciation (5 year amortization) $1,000 per year	5.00	2.50	1.66
Storage @ average of $25 per month	1.50	75	50
TOTAL COST PER HOUR	10.60	7.35	6.26
TOTAL COST PER PASSENGER MILE	2¢	1.5¢	1.3¢

INSURANCE COSTS. Because of the wide range of insurance coverage available no specific figures on insurance have been included in the table above. The following approximate figures can be used to calculate insurance costs:

All-risk hull insurance per year*	$550.00
Public liability $25/50,000 limits	$ 20.50
Property damage $50,000 limit	$ 30.00
Passenger liability, 3 seats $10,000 limit	$ 95.00

*Hull insurance for wind, fire, and other ground accidents alone is only $164.00

FOUR-PLACE PLANES—The chart *(above)* contains representative figures conservatively calculated on the cost of operating a typical $5,000 four-passenger medium-performance airplane with a 125-mph cruising, 500-mile range

ANNUAL USE	200 HOURS 32,000 MILES	400 HOURS 64,000 MILES	600 HOURS 96,000 MILES
Gasoline and oil—10 gals. @ 30¢ plus ½ pt. oil per hour	$3.20	$3.20	$3.20
Inspection, maintenance and reserve for engine overhaul	2.82	2.82	2.82
TOTAL DIRECT OPERATING COST	6.02	6.02	6.02
Depreciation (5 year amortization) $2,400 per year	12.80	6.00	4.00
Storage @ average of $30 per month	1.80	.90	.60
TOTAL COST PER HOUR	19.82	12.92	10.62
TOTAL COST PER PASSENGER MILE	3.7¢	2¢	1.7¢

INSURANCE COSTS. Because of the wide range of insurance coverage available no specific figures on insurance have been included in the table above. The following approximate figures can be used to calculate insurance costs:

All-risk hull insurance per year*	$960.00
Public liability $25/50,000 limits	20.50
Property damage $50,000 limit	30.00
Passenger liability, 3 seats $10,000 limit	95.20

*Hull insurance for wind, fire, and other ground accidents alone is only $330.00

HIGH-PERFORMANCE PLANE—This chart *(above)* shows operating costs of a four- or five-place high-performance airplane. Figures are based on operating typical four-place $12,000 airplane (*Navion, etc*) with cruising speedof 160 mph

Lawrence N. Shupp, Assistant Field Superintendent of the Graver Tank and Manufacturing Company, of East Chicago, Ill., is another businessman aware of the utility of a private plane. In one day, Mr. Shupp checked on erecting jobs in Allentown, Pa., Camden, N. J., Atlantic City, Nantucket Island, Mass., and Providence, R. I. From Providence, Mr. Shupp flew back to Allentown . . . all in one day by plane.

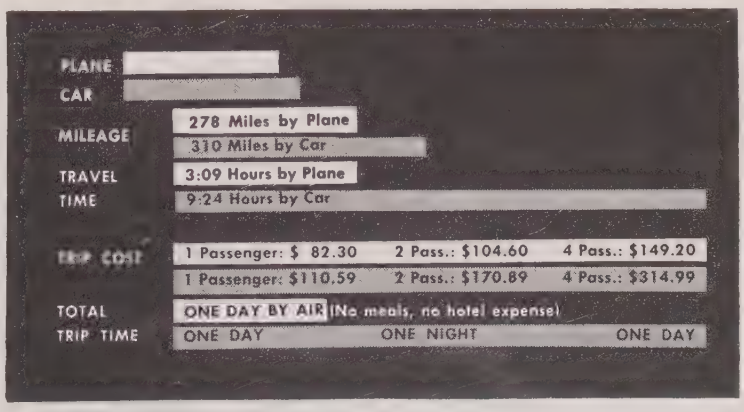
But the big corporation or small firm are not the only ones enjoying profit in plane ownership. Many farmers and ranchers own small personal planes, and they consider their aircraft as important an improvement in ranch or farm operation as the truck was over the chuck wagon.

Actually, the airplane is perfectly adapted to agricultural use because it serves so many useful purposes every day. Added to this is that extra in "utility" which enables the plane to be operated right from the farm or ranch. As one South Dakota stockman puts it: "I will never operate my farm without my airplane as a standard piece of equipment." Judging from the list of jobs his plane does to perfection, it isn't difficult to understand that stockman's attitude toward owning an airplane, and its value to him.

The small two-place personal plane or even a sizeable four-placer can be used to inspect crop conditions, to fly to market, to get supplies in and out when snow or mud blocks roads, to locate strays, to check irrigation and windmills, to drop salt, to direct roundup operations, to check corrosion, or to attend more livestock sales.

Thanks to the plane, no farm or ranch need be isolated. With a 120-mph airplane, it would take only 25 minutes to fly from ranch home to a city or town some 50 miles away. Indeed, time is saved by all personal-plane operation, whether it be in flying from farm to a distant market or in the actual performance of farm chores. And time means money to the farmer just as it does to the urban industrialist.

Professional men and women, too, find the ownership of aircraft to be profitable for business and pleasure. One well-known Michigan physician, Dr. Charles C. Eades of Grosse Point, has stated, "I use my plane for extensive cross-country transportation. It has definitely (*Continued on page 50*)



TIME, MONEY COMPARISON—This graph *(right)* presents time and money comparison between plane and car on a typical business trip. Figures are based on an actual trip; trip cost includes operating expenses plus meals, hotel, salary of personnel enroute

BUSINESSMEN using aircraft know necessity of getting maximum range; therefore operate at best range and cruise speed

Add Miles to Your X-C

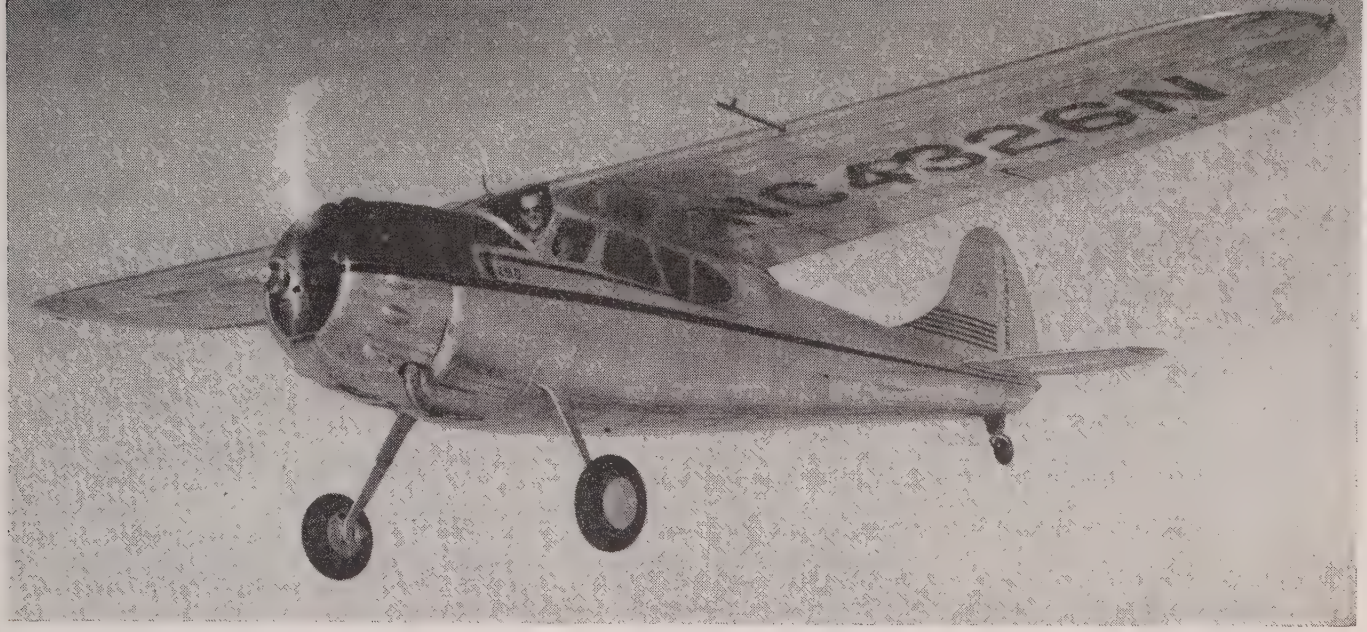
It looked like a ghost flight. Plodding along behind his mule, the Tennessee farmer saw nine fighters in the blue sky overhead. Two of them, their engines sputtering, fishtailed crazily. A third, obviously nursing a dead stick, peeled off and headed for the farmer's cornfield.

His propeller wind-milling in the breeze, the first plane to leave the formation landed wheels-up a short distance from the amazed farmer. In quick order, the others followed. Some here and some there, the nine airplanes spotted the landscape with a series of most unmilitary landings. As if loathe to repeat the tactics of the man ahead of him, each pilot, in turn, ground-looped, skidded or just plain flap-faddled to a stop as the terrain and his respective manner of approach dictated.

Based in Florida, these fighters had been dispatched to Smyrna Air Base to escape a hurricane bearing down upon the peninsula. Landing at Turner Field, the flight had refueled. Then, taking off in weather cleaner than an infantryman's dinner plate, they had set out for Smyrna.

At fighter speed, Smyrna is just over an hour's flying time from Turner. The leader had ordered his pilots to take aboard enough fuel for this distance, plus a small reserve. But in spite of an

PRIVATE-PLANE owner or operator can save fuel and engine maintenance through the application of maximum-range procedures to all their long cross-country flights



PLANE MANUFACTURERS today provide cruise-control charts. Cruise-control chart worked for Cessna 190 is shown below

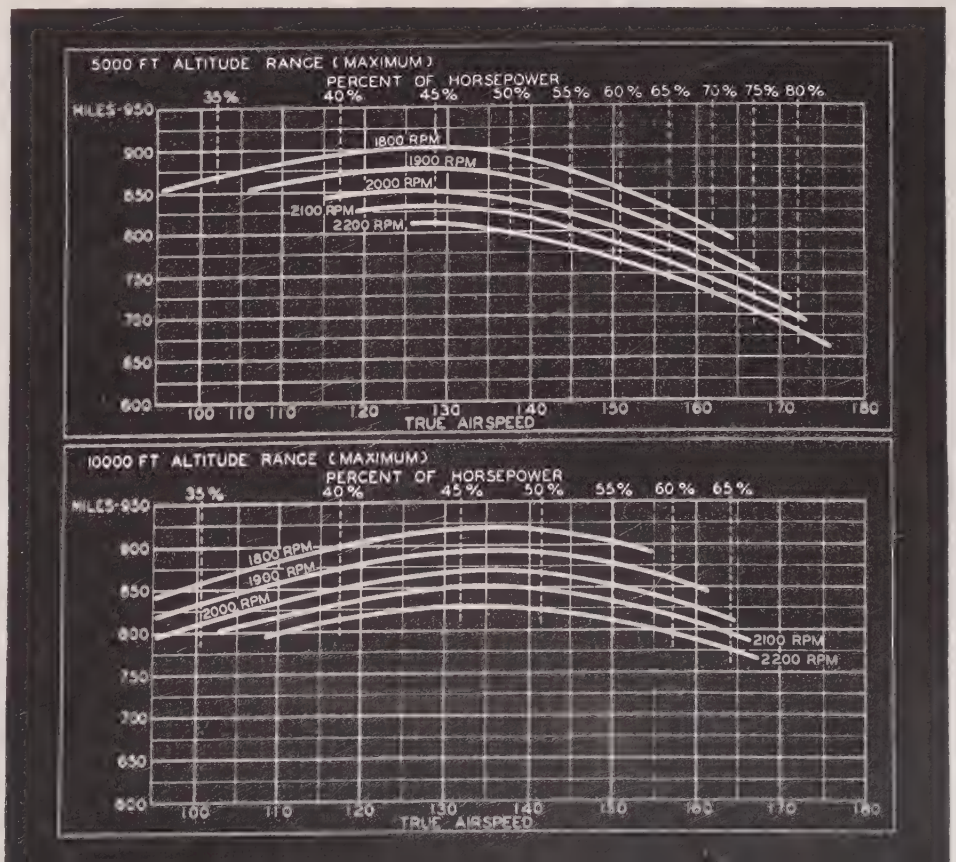
iron beam, clear skies and a major airway, the flight lost themselves. Out of gasoline, the leader had led his fellow flyers into various and sundry cornfields rather than risk landing on rougher ground.

Later, I asked the leader what had happened. "Can't figure it out," he said. "When my ETA was up, I throttled back on purpose. Should have had plenty of fuel. Guess I must have hit a pretty strong headwind."

Unfortunately, this type of experience is all too common. Less spectacular, perhaps, but equally serious are the dozens of flights which end in equally humiliating circumstances. And often these "out of fuel" forced-landings lead to tragic results. Most, if not all, such mishaps can be avoided. Lying at the root of many similar accidents is one of aviation's most common misconceptions: the fallacy that a reduced power setting will increase range. It can. But too often it does not. Take the widely-circulated story of the well-known flyer during the late war.

Skooting ahead of a stiff, tail wind, this man and his crew overshot their island destination. Lost and running low on fuel, he ordered his pilot to cut the two outboard engines. This, he reasoned, should have lowered the fuel consumption with a subsequent increase in range. He overlooked one important fact. To maintain flying speed, his two remaining engines used more gasoline than would have all four under maximum-range conditions. Nor is this reasoning confined to multi-engine aircraft. On two engines or even one, an understanding of the difference between maximum-range flight and maximum endurance flight can (*Continued on page 42*)

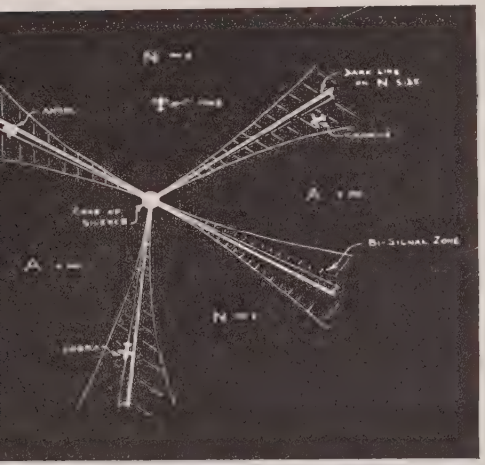
By WESLEY NEAL



CRUISE-CONTROL chart for the Cessna 190, popular executive plane, shows maximum range at 5,000 feet is 900 miles, 1800 rpm, at 130 TAS, and using 45 per cent power

LF Radio for VFR Flight

ILLUSTRATION 1—What identification signals are heard where are shown on "Beam" diagram *(below)*. Note planes



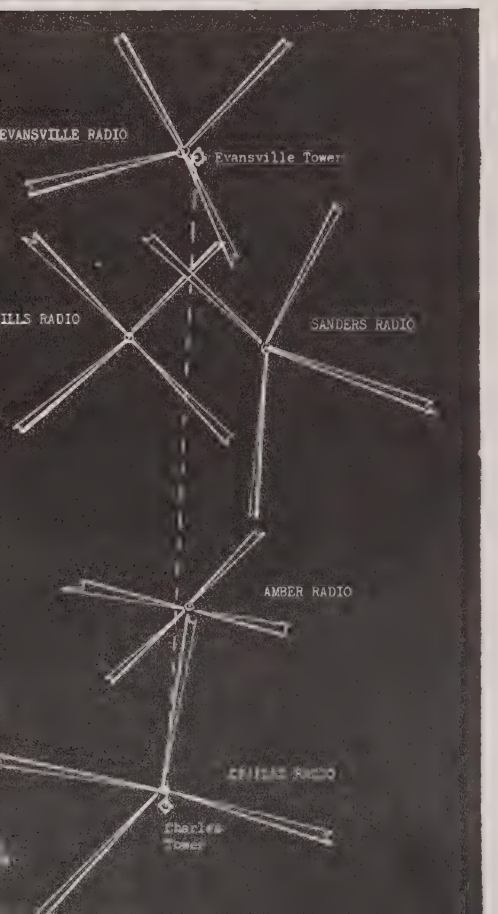


ILLUSTRATION 2—Aids within reach of a pilot in a radio-equipped plane are shown in this radio diagram *(left)*

RADIO is the heart of CAA air traffic control. Air traffic today is 10 times heavier than it was back in 1942

By V. A. PREVETTE

AN AIRCRAFT radio is a versatile piece of equipment. It takes the strain out of navigation, picks up weather reports, procures needed information as to condition of airports, helps the pilot through teeming traffic patterns at large fields, brings him prompt emergency assistance and can even "find" him if he gets lost!

There is, however, a surprising lack of know-how regarding specific use of aircraft radios. As a rule, when a radio is installed in a plane, a pamphlet on its operation is given the pilot, but this pamphlet contains little, if any, information as to the actual use of a plane radio. Because of this shortage of information, many pilots believe a radio is more of an instrument flight aid than a VFR (visual flight rules) aid. Actually, the radio set is closely related to a private pilot's "contact" cross-country flights. Through no fault of their own, many aircraft owners today are not using their radios to the fullest advantage. Though low frequency ranges are to be shut down (completely by 1954), the majority of lightplane radios in use at present are low frequency sets.

Suppose a pilot has such a low frequency set in his plane. About

PILOT contacts the tower on control tower's frequency, and gets his okay to taxi out to the take-off position

PILOTS using larger airports are now for the most part required to contact tower via radio, preferably two-way radio

CESSNA 41684 made flight from Evansville to Charles Airport *(see Illustration 2)* to show use of radio for navigation

LF RANGE stations *(below, right)* are spotted across country. VHF eventually will replace all low frequency ranges

the first thing he will want to know is how to get the thing turned on. Soon he discovers that he must turn his aircraft Master switch on and then, just as in using his radio receiver at home, turn the knob marked "Volume" to the right to turn the set on and to increase the volume.

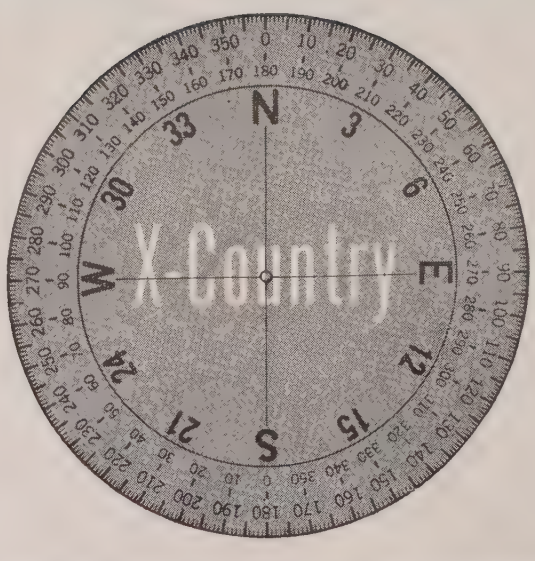
There may be various settings that he can use on his radio . . . he'll probably find a knob marked "Loop" and "Antenna." This the pilot will keep set to "Antenna" all of the time except when he wishes to use another radio instrument known as ADF, a radio compass.

Another knob may be marked "Range," "Voice," "Both." There may even be a fourth position on this selector labeled "Tower." The tower frequencies formerly were all 278 kc. At present, due to the increase in the number of airports with control towers, this practice has been altered. Now a tower frequency may be on other settings. Consult your chart and specifically the small "box" near the name of the airport to determine the tower frequency for that airport. If it is 278 kc, then the "Tower" setting can be used, otherwise tune the radio manually just as in tuning your home set.

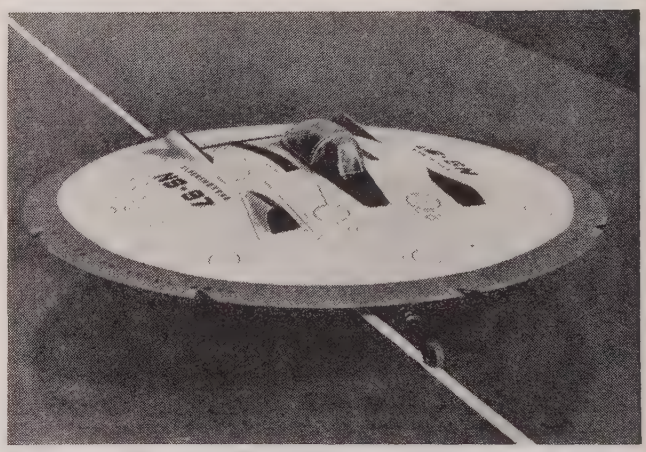
The "Range" setting is used for receiving range only.

The "Voice" setting screens out much of the range signal and enables the pilot to hear voice transmissions more easily.

If a pilot desires to receive the range signal (*Continued on page 44*)



ROYAL NAVY shows off its new Hawker *Sea Hawk*, a single-seat jet fighter powered by a Rolls Royce *Nene* engine of 5,000 pounds thrust. While performance figures are still secret, and indication of the *Sea Hawk's* speed showed up in the 584-mph lap flown in 1950 SBAC Race.



FLYING SAUCER, (model, that is) was built by Nick Stasinos, a Northrop Aeronautical Institute graduate of Inglewood, Calif. This photo shows the two main jet installations in the center section, and a portion of the eight turbo-jet ports on outer revolving disc. It's called "NS-97."

BRISTOL 171, production version of the Bristol helicopter, was designed for a variety of civil and military duties, including air taxi, air/sea rescue and reconnaissance work. It is powered by a 550-hp nine-cylinder Alvis *Leonide* engine, has a three-bladed main rotor, anti-torque rotor.

SUPER CONSTELLATION is one of the newest U.S. airliners. As the photo below shows, the "Super Connie" is considerably larger than its predecessor (is 18.4 feet longer). Designed to accommodate 3500-hp compound engines, the *Super Constellation* has 30 per cent more power.

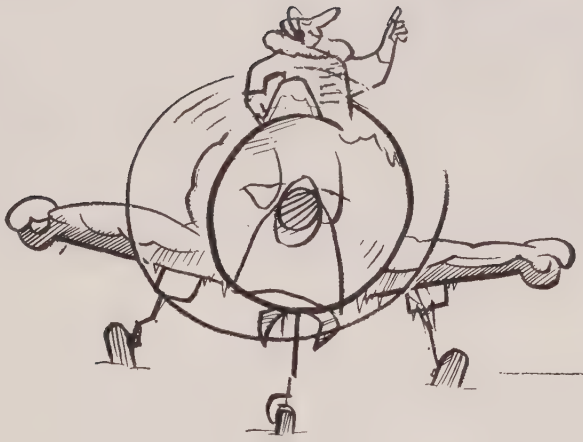
MARTIN 404 is shown here in its first flight. This new 40-passenger airliner has a gross take-off weight of 42,750 pounds. Powered by two Pratt and Whitney 2400-hp engines, the 404 is expected to have a top speed of 312 mph and a range (maximum) of 2,575 miles. The long boom near left wing tip in the photo is the airspeed indicator used during tests. Deliveries to the airlines are expected to begin early in 1951, with 40 for TWA and 35 for Eastern Air Lines. A military version of the Martin 404 is also presently under develoment at the Glenn L. Martin plant at Middle River, Maryland.

SEIBEL MODEL S-4 is a new two-place helicopter designed by Charles M. Seibel, president of Seibel Helicopter Co., Wichita, Kansas. This 'copter has a design gross weight of 1500 pounds and actual empty weight of 90 pounds. It is powered by 125-hp Lycoming engine. Unique with the Seibel designed is the way the problem of balance with varying loads has been solved: cargo and passenger space is located at center of lift, as are fuel tanks of 19-gallon capacity.

AEROCAR designed and built by Moulton B. Taylor is shown here in test flight over Longview, Washington. This model is powered by 100-hp Franklin engine while another version is expected to have a Lycoming 0-290-D engine. The *Aerocar* is a two-place "flying automobile" having a cruising speed of over 100 mph and a range of more than 300 miles. As a car, the plane's wings and tail are removed and can be towed as a unit. Safe ground speed for the *Aerocar* as an auto is said to be over 50 mph.

BELL H-12 was designed and produced for the Air Force. The largest 'copter is the Bell series, the H-12 weighs about 7,000 pounds and can carry 10 persons plus a pilot and a useful load of over a ton. Powered by 600-hp Pratt and Whitney R-1340 engine, the H-12 has a cruising speed of 85 mph, a top speed in excess of 120 mph and, with its normal fuel capacity, a range of over 500 miles. Air/sea rescue is a function of H-12. Its power-driven hoist has a capacity of 400 pounds.

DILBERT



By S. H. Warner
and R. Osborn

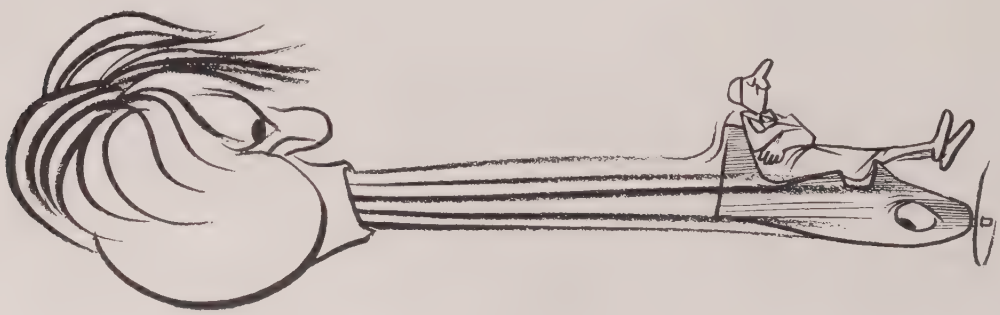
Bewildering Report—While making a simulated GCA approach in Seattle, a pilot was surprised to receive a weather report indicating a 400-foot ceiling with snow and one-mile visibility. Since the local weather was CAVU, the pilot asked for a repeat on this not-encouraging weather report.

Two replies were immediately received, one confirming the first report and the other, on the same frequency and equally clear, giving unrestricted visibility and ceiling.

The perplexed pilot completed his landing, then inquired about the conflicting reports. The mystery was solved when it was found that the Ground Control Approach controllers at Seattle, Washington, were transmitting on the same frequency as a similar group located in Alaska.

Could This Be You—The day after Dilbert logged 1,000 hours flight time, he went on a 400-mile X-C. The day was clear so he didn't bother to check the weather. That's why he didn't know he had a pretty strong tailwind aloft. Had he navigated en route, he soon would have discovered this, but the weather was so nice he figured he couldn't miss if he just started out on the right heading.

Dilbert's plane had a cruising speed of 100 mph, so three hours and 50 minutes after take-off he started looking for the field at his destination. Somehow or other, it wasn't there. With 15 minutes fuel remaining, he turned on his radio and picked up the "A" quadrant. Figuring he was still short of the field, he kept on going. He realized his mistake when the beam (*Continued on page 52*)



"Prelude to an accident—Convertabrain Dilbert wearing a Flat-hattitude."

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

New Members

Seven new members were added to the CAOA roster at the meeting of the directors on December 5th, as follows:

Daniel Peterkin, Jr., president of Morton Salt Company, Chicago, who is the registered owner of the company operated Douglas B-23. P. W. Kessler is chief pilot. Mr. Peterkin is also a pilot, with a record running back to the early '20's, and a firm believer in the value of company aircraft operation.

Packer Pontiac Company of Detroit. This company has operated aircraft in connection with its business since 1933. Present aircraft is a Grumman *Goose*, operated by W. M. Packer, Jr., Secretary and Treasurer, who has a commercial rating. Company president W. M. Packer, Sr., is also a pilot.

Plymouth Oil Company, Pittsburgh, operates a Douglas DC-3 and modified Lockheed C-60 from Pittsburgh, a Twin Beech in Sinton, Texas, and a Cessna 195 in Midland, Texas. The application was signed by W. S. Hallanan, president. Chief pilot is Stanley N. Siggins.

Chase National Bank of the City of New York has been operating a Douglas DC-3C for the past three years, based at Roosevelt Field, Mineola. Official in charge of aviation is Cole J. Younger, Vice President, and chief pilot is Captain Arthur P. Zimmer, Jr.

Anchor Hocking Glass Corporation of Lancaster, Ohio, has operated a Beechcraft D-18S since September 1946, now based at Port Columbus airport. The application was signed by Cyrus L. Fulton, Treasurer. James E. Kidd is the company pilot.

Hoyt Machine Co., of Indianapolis, is a manufacturer of screw machine products. The firm operates a Twin Cessna. Fred W. Sommer is a partner and company pilot.

Signal Oil & Gas Company, Los Angeles, operates a very plush Douglas DC-3. W. E. Walkup, assistant to the president, will represent the company at CAOA meetings. Orlin M. Sorensen is chief pilot.

New and Bigger Planes

During the past few months the trend among CAOA member companies has been in the direction of switching to larger aircraft as well as adding new planes to their operations.

First to come to our attention was the Pacific Mills (Boston) switch from a Beechcraft 18 to Douglas DC-3. Holley Carburetor of Detroit has made the same exchange. Continental Oil (Ponca City) dropped their Lockheed 12 for a DC-3.

Joyce Lumber (Chicago) stepped up from a Beechcraft *Bonanza* to a D-18, and Red Devil Tools (Irvington, N. J.) from a Cessna 195 to a Twin Beech. Essex Wire (Detroit) dropped their five SNJ trainers and picked up a third Beechcraft *Bonanza*.

A step in the other direction was F. C. Russell Company's switch from a Beech C-18 to a *Bonanza*, retaining their D-18S.

Additional aircraft acquired include the following: Champion Paper & Fibre's Lockheed PV-1 and Sinclair Refining's DC-3, both modified by Spartan Aero of Tulsa. Gaylord Container picked up another DC-3 (Remmert-Werner). Parker Pen and Grimes Mfg. Co. each added a Beech *Bonanza*, and Spartan Aero a *Navion* and another Spartan 7W. . . . Other additions are in progress.

GERBER PRODUCTS CO., of Fremont, Mich., operates Twin Beech. Flying businessmen are *(left to right)* E. Johnson, vice pres., Dan Gerber, pres., J. Nagley, mgr., and Pilot C. Chiles

Latest "Skybaby"

Having its main plant and general offices in Fremont, a small Michigan city that is without passenger train service, is no great handicap to the Gerber Products Company. That is because the company depends on its own aircraft operation.

Dan Gerber, president; Frank Gerber, president of the Board; Earle Johnson, V-P and director of sales, and others use the plane almost daily. Many flights are made to Chicago (one flight hour away), to the company's plant at Rochester, N. Y., and to its Canadian factory at Niagara Falls, Ont. The airlines are used as a rule for trips to the Oakland (Calif.) plant, with the company Twin Beech making connections with airliners in Detroit or Chicago.

Charles R. Chiles has been pilot for the Gerbers since the first plane (a Twin Cessna) was purchased in 1946.

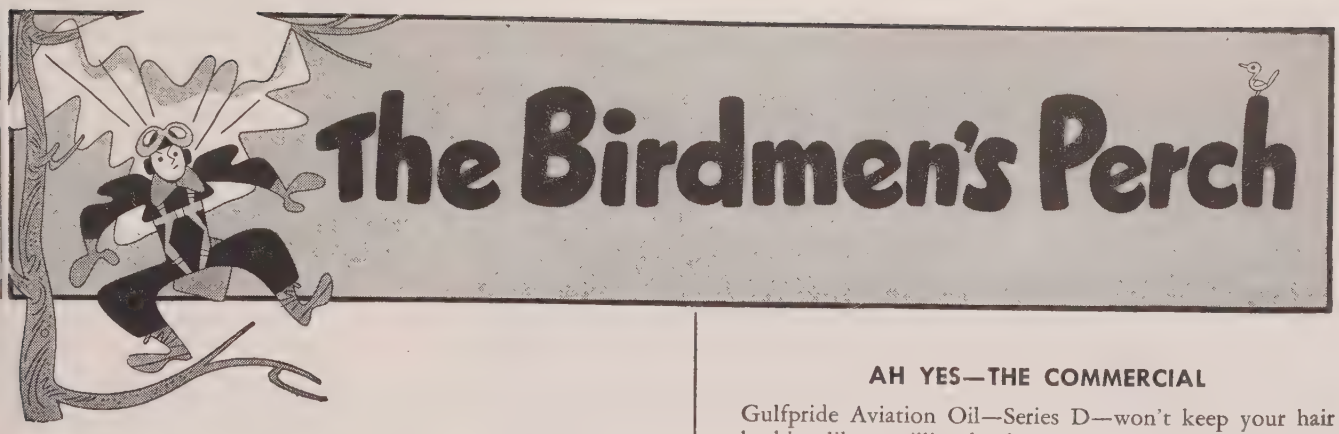
Civil Aircraft Parts

As we go to press the status of parts, equipment and supplies for non-airline civil aircraft is depending on the workability of Department of Commerce Order 127. This order was effective November 20, 1950, and on November 29th an Information Letter on the subject was sent out to all CAA Regional Administrators.

The order set up the CAB as claimant agency for "whole" transport type aircraft used by scheduled and large non-scheduled civil air carriers. The CAA will serve as the claimant agency for all other whole civil aircraft, all spare parts and maintenance supplies, fixed base operations, executive aircraft operations, private flying, etc.

An Interim Program on a case-by-case basis for emergencies operates with NPA (National Production Authority) directives for "material" requirements.

A Long Range Program involving coordinated military and civil requirements is being worked out. CAOA may be asked to act as the agency for setting up the estimated requirements of all company operated aircraft in the U. S.



A hangar, a hangar, my kingdom for a hangar!

If you're one of those bright-faced enthusiasts, happily contemplating plane ownership, take heed!

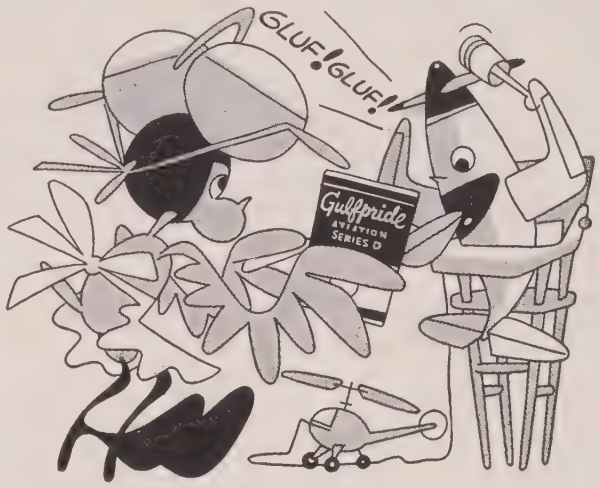
Hangar space is at a premium! All of which means that when you set that shiny hunk of merchandise down at the local airport, you'll probably have to settle for tie-down space in the cold outside!

Any flyboy will tell you that all that dust and moisture floating around in the ozone present some not-too-amusing maintenance problems!

We think, *even before you become the proud possessor of a bill of sale*, it would be wise to look pretty thoroughly into this matter of "outdoor parking"!

AH YES—THE COMMERCIAL

Gulfpride Aviation Oil—Series D—won't keep your hair looking like a million bucks! It won't even pep up a salad dressing!

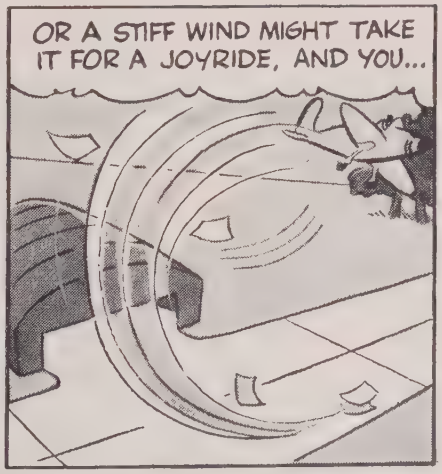


But—by Jupiter—it's the finest detergent dispersant oil for horizontally opposed engines there is!

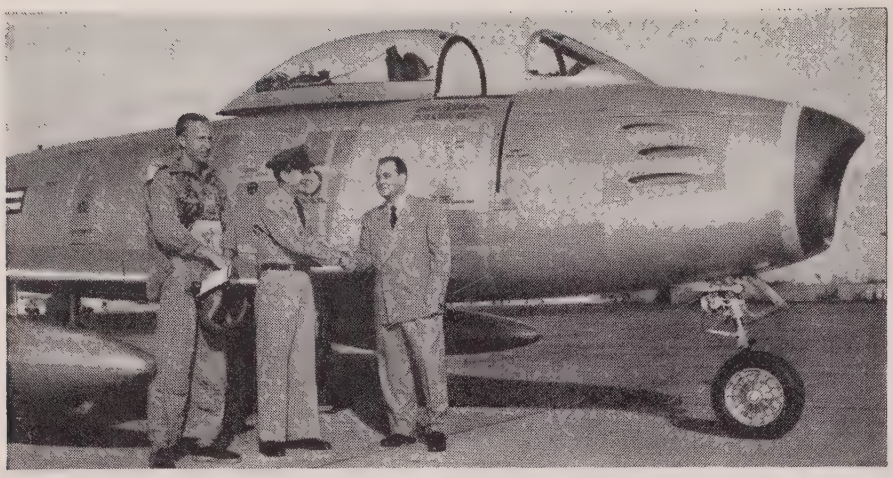
Let's face it, Gulfpride Aviation Oil—Series D—is the only aviation oil put through Gulf's exclusive Alchlor process to remove those extra carbon and sludge formers. It keeps valves and rings happy as a bunch of school kids on a picnic.

Whether you're the outside loop type, or one of the soar-and-see variety, Gulfpride Aviation Oil—Series D—will increase those periods between overhauls up to 100%—yes, 100%!

GULF
AVIATION PRODUCTS



Gulf Oil Corporation . . . Gulf Refining Company



NAA's Smithson, Adams *(left)* accept congrats of Col. Creech on completion of F-86A contract

MILITARY AVIATION

Hire 10,000

Pratt & Whitney Aircraft division of United Aircraft Corporation plans to hire an additional 10,000 employees during 1951 to meet the demands of its accelerated engine production program for the Air Force and Navy. Employment at P & W's East Hartford, Conn. plant hit a postwar high of 17,500 early in November. This compares with 14,996 on January 1, 1950.

Over-Water Hop

When an air/sea rescue twin-engine Grumman SA-16 landed at Hickam AFB, Hawaii after a 2,400-mile hop from California, it had completed the longest over-water flight ever made by the twin-engine Grumman amphibian. Carrying no special gear for the flight, the recently modified SA-16 carried fuel in the wing floats in addition to droppable fuel tanks under each wing. The flight was made from Travis (formerly Fairfield-Suisun) AFB.

Last F-86A to Duty

North American recently made its last delivery of the F-86A *Sabre* jet fighter to the Air Force. As the F-86A left the production line, two later versions, F-86D and F-86E, moved into sub and final assembly. The F-86D is a new all-weather interceptor designed to climb to extreme altitudes quickly. It is powered by GE J-47 engine with afterburner. The F-86E is designed for better control at high operating speeds. The entire horizontal tail surfaces of the F-86E are controllable to give the airplane better longitudinal control, eliminating the loss of effectiveness of the surface due to heavy air loads at extremely high speeds.

Raincoats for Radomes

The so-called "gentle rain from heaven" is anything but that to the pilot of a jet airplane. Flying at 400 mph in the rain, many a jet pilot has landed after a short flight to find little left of the pin-up girl he had painted on his plane's fuselage. On one test plane flown through the rain for 20 hours at 400 mph, rain eroded away most of the pure aluminum cladding on some of the leading edges. At that speed, it would take only a few minutes for rain to really do a job on a radome. Du Pont has provided one answer: a thin coating of neoprene, a synthetic rubber, has been applied to the radome. It has been discovered that this coating, only 10 to 12 thousandths of an inch thick, prevents damage to laminates for 10 hours in test flights at 400 mph through rain.

Who, Us?

Officers and men of the Second Battalion, First Marines, are getting a laugh from a recent directive from Headquarters Marine Corps. After more than a week on the front lines in sub-freezing weather, the Marines returned to find the following memorandum among the official mail:

"*. . . if more than 50 per cent officers were on the field at one time, the offending team will be penalized.*"

The football field had somehow become tangled with the battlefield.

Helmet Victor

Aero Medical Laboratory at Wright-Patterson AFB has developed a new spherical visor that virtually glues a crash helmet to a flyer's head in bail-outs of more than 500 mph. This insures a pilot that his helmet with its oxygen equipment will stay with him in high-speed escapes from jet aircraft.

Special Delivery

A new pair of shoes and a tardy first mate gave Flight D, 2nd Air Rescue Squadron, Guam, credit for an unusual helicopter rescue. It seems that the first mate of a tanker anchored in Guam harbor needed a pair of work shoes and so went ashore to get them. No one knows exactly what held up the first mate but when it came time for the tanker to sail, said first mate was not aboard. The ship's captain waited, but . . . still no first mate, and so the tanker finally pulled out without him. A short time later the stranded delinquent officer showed up at Flight D's headquarters. Harnessed to the hoist of Flight D's Sikorsky H-5 'copter, the mate had a 30-mile ride before catching up with his ship. The sailor was lowered into the tanker . . . almost, that is. He landed on the flag pole and was last seen scrambling down the pole to the deck, new shoes tied around his neck. Pilot of the 'copter was Lt. Robt. L. Dunlap of Utica, Ohio.

News Notes

U.S. ARMY has doubled its previous order (up to 500 planes) for Cessna L-19's. The L-19 is a reconnaissance aircraft powered by 213-hp Continental engine.

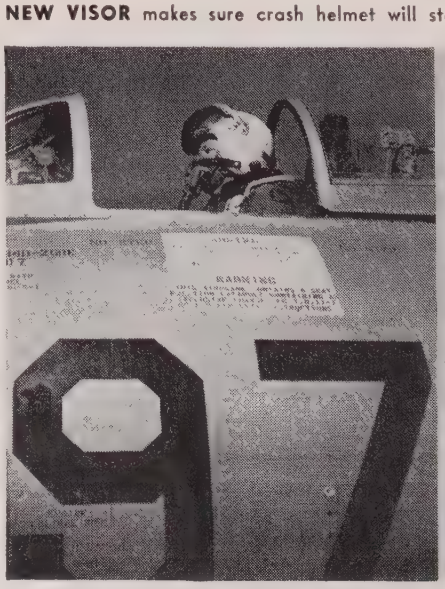
MARINE CORPS is buying 30 Fairchild C-119 *Packet* troop and cargo transports.

BELL AIRCRAFT is closing negotiations for lease of Globe Aircraft factory at Ft. Worth, Texas, to build B-36 and B-47 jet engine nacelles for Convair and Boeing.

CONSOLIDATED VULTEE has added Charles D. Perrine, Jr., specialist in missile homing guidance systems, to its electronics and guidance section of the engineering dept.

NORTHROP AIRCRAFT recently appointed George N. Mangurian as chief of structures of Northrop Aircraft.

NEW VISOR makes sure crash helmet will stay on pilot's head during high-speed bail-out



Autopilot

(*Continued from page 13*)

dial is the Cross-Pointer Indicator, and below it is the LTRA-5 VHF transmitter-receiver, with a second VHF transmitter at lower left; this doubles the available channels and, as it has a separate power supply, affords a standby set. To its right is the *Orienter* control; the dial is on the right-hand side of the panel, out of the photo, as is the *Omniscope*. Above the *Orienter* is the Directional Gyro, one of the components of the L-2 Autopilot; above this and to the right is the Attitude Gyro, another L-2 component. The Autopilot controller is at extreme right of photo (*pilot is adjusting*), and the Engage Switch far to the left, on the control wheel.

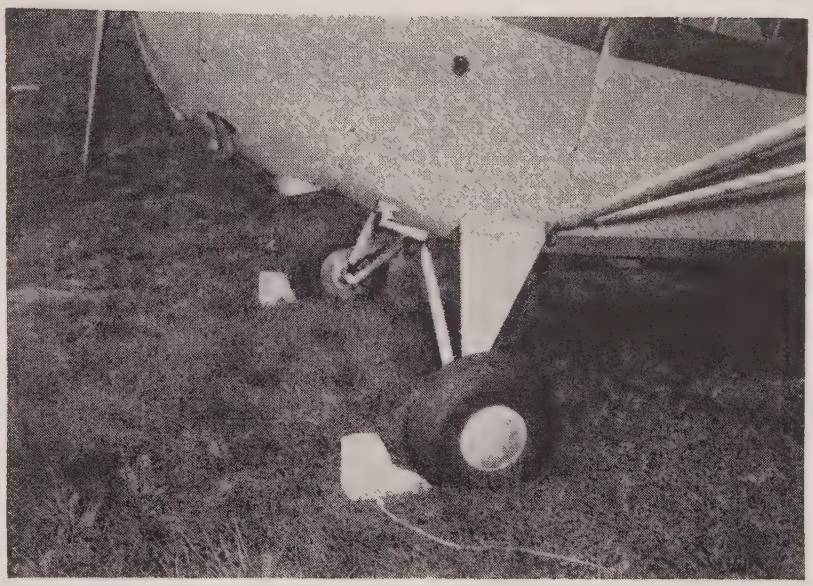
We took off from Runway 30, altering our 30° heading to 35° as we climbed to about 2,000 feet and levelled off. Flicking the Engage Switch to 'On' position, we let the L-2 worry about flying the airplane while we got out the charts, checked the frequency of the Baltimore range, and set our course on a 45° heading with the *Orienter* and then double-checked with the *Omnimatic*. During this time the *Bonanza* moved along, steady as a rock. You could move around, reach for another chart, pick up a pencil if you dropped it, handle your radio communications, jot down a report of wind and weather, and keep your eye peeled for other traffic—all with the assurance that your heading was being maintained for you, straight as a die. Those little spinning gyros were holding the plane laterally and longitudinally level.

Here's how it works. In an automatic flight-control system there must be a "reference position" from which any deviations are instantly detected and to which the aircraft is almost as instantly returned. This must be in both the vertical and horizontal planes. In the L-2 these reference positions are established by two electrical gyroscopes, especially developed by Lear. These are called the Attitude Gyro (vertical plane) and the Directional Gyro (horizontal plane). *—see 3 & 4 on diagram, page 13.*

If the plane moves from the relative position set up by the Attitude Gyro, by either rolling or pitching, or from the directional reference set up by the Directional Gyro by yawing, the gyroscopic inertia or rigidity caused by the rapidly spinning rotor of either gyro will bring the plane back again instantly.

The trick is to get this automatic control to effectively work the airplane's control surfaces—rudder, elevator and ailerons. For this job the Amplifier is the vital nerve center of the entire L-2 system (*No. 6 on diagram*). Inside the black box which houses the Amplifier unit are a number of electrical circuits. When there is any change in the airplane's attitude, an electrical impulse is sent to a small electro-mechanical mechanism called a "servo." This unit, in response to signals from the Amplifier, supplies the force required to operate the airplane's control surfaces. It actually is a triple-servo (*see 8 on sketch*) which has three output drives, one connected to each of three sets of the plane's controls; when actuated they deflect the surfaces just enough to put the airplane back on course. This only takes a split second and as a result the plane stays in perfect level flight and on course, straight as an arrow.

WING TIP...



A pull rope increases chock safety. The use of pull ropes enables linemen and other field personnel to remove wheel chocks with greater ease and safety. The form-fitting wooden chocks shown in the photo have holes drilled through them for attaching the pull ropes. A knot is tied at one end of the rope and the other end is passed through the hole. Another knot is tied where the rope projects from the chock. This forms the simplest and most fool-proof method of attachment of the rope to this type chock. The form-fitting chocks are made from 6 by 6 or, preferably, 8 by 8 lumber. A band saw is handy to cut one end to fit the contour of the plane tire. Form-fitting chocks on both wheels will minimize "creeping." Painting the chocks and the pull ropes white will make them easy to locate for use. *Bob Blatt*

In addition to this, however, the L-2 is a maneuvering pilot. To demonstrate this, we tried a few turns. Rotating the "Turn" knob a few times produced some of the smoothest, most beautifully coordinated turns I've ever experienced. Rolling the "Pitch" knob backward toward "Climb" (or NOSE "Up" on the production model—*see photo, upper left, page 13*) brought us to 4,000 feet in a steady, constant-rate climb. Then a slight roll forward brought us back to 3,000 feet in an even descent.

Norm then applied the flaps to show me what would happen, or rather what wouldn't happen. Usually on the *Bonanza* or *Navion*, there is a rather abrupt "dip" when the flaps take hold, but with the L-2 engaged we didn't feel a thing. The attitude of the plane remained as it was because the L-2 automatic trim-tab servo (*No. 2 on diagram*) compensated for the changing nose heaviness. It was amazing to see the trim-tab wheel rolling back by itself to put in exactly the right amount of trim.

It was a fairly calm day, but as we came down to about 1500 feet approaching Friendship International, Norm disengaged the Autopilot for a few minutes and we experienced a couple of not too violent bumps; but after switching on again, the L-2 must have just brushed them away. That's where that instant reaction business comes in—the L-2 Autopilot applies corrective action in a split second. In fact, it almost seems to anticipate what to do.

On the way back to Washington, I found out who some of the well-known pilot-business men are who now are using the L-2 in their planes. Merrill Meigs of Chicago got one of the first ones for his *Bonanza*, and other *Bonanza* installations include Vance Breese (west coast test pilot and executive), Paul Butler, president of the Butler Paper Co. and Butler Aviation; and industrialist E. L. Cord. Clarence Morris, builder and contractor, has one in his Cessna 195, H. R. Boyer, General Motors V-P of Production Engineering, in his *Navion*, and Len Ormsby, Texas industrialist, in his *Navion* 260. Arthur Godfrey has one in his DC-3.

Production was set up on the basis of 100 per month beginning this past December and, considering the reasonable price of $2,990, and the surprisingly low weight (29.7 lbs. plus 5.8 lbs. for the gyros), these Autopliots should find a ready market in the *Bonanza-Navion-Cessna* group, the Beechcraft 18, Grumman *Mallard*, *Lodestars* and DC-3's.

As time was running out, we skipped the simulated ILS approach at Washington National. I was quite willing to take Frank Cornish's word, however, that the L-2 had brought him in more smoothly and with far less effort than was required by hand with the conventional instruments.

The big impression I got from the whole experience was that here was flying with complete and utter relaxation—no matter how long a trip.

Air Support . . . USMC

(*Continued from page 15*)

same tables, and slept in adjacent bunks. Each was schooled in the other's part on the Marine Corps team. Ground and air Marines came to understand the job facing each other. They both realized that the other's task was difficult, but they also realized that by working together as a team the job would be much easier and less costly in men, time and material.

During the time in which the Marine Corps was developing its land-air team, it was also lending special attention to the development of aircraft suitable for both land- and carrier-based air support of ground forces. The Marines were aware of the fact that their ability to lend immediate support to amphibious operations would depend largely on their skill in operating from carriers. Fighters and dive bombers were designed for this mission. Through the years these types were gradually combined to give Marine airmen a dual-purpose fighter-bomber —such as the famed F4U *Corsair*—which could meet and defeat the enemy in the air as well as bomb and strafe them on the ground.

There is no doubt about the importance this completely integrated air-ground team, with an air component unequalled anywhere else in the world for its equipment, its technique, and above all, its complete subordination and devotion to the needs of the ground component, played in the final and complete defeat of Japan.

Immediately following the end of World War II, the hue and cry went up that tactical air support was obsolete, and some advocates of strategic air power went so far as to infer that ground forces would no longer be needed in large numbers. Despite discouraging cuts in manpower and equipment, the Marine Corps continued to train and develop its land-air team, again stressing the importance of close air support.

When war clouds gathered over Korea, and the communist hordes began their invasion to the South, the Marine team was again ready. Ready once more to prove what they had maintained throughout the years—that the land-air team of the Marine Corps was an effective weapon that was sorely needed in the defenses of America.

When units of the First Marine Division departed for Korea, its aerial support went right along with it. Today Marine air and ground forces are again showing the advisability of maintaining a strong tactical air arm. Leatherneck flyers, directed to targets by ground air control teams, are lending badly needed close air support to Marine, Army, British and South Korean ground troops.

Flying a vastly improved version of the original *Corsair*, Marine pilots are striking artillery, tanks, troop concentrations, and numerous other targets with bombs, rockets, 20-mm cannon and napalm bombs. The consensus of opinion in the Pacific indicates that the Chance Vought F4U fighters used by the Marines are still the most effective and suitable for close air support work in Korea.

Captured North Koreans have termed the close tactical air support of the Marines as the "deadliest weapon" they have had the misfortune of encountering to date.

Cubs for Combat

(*Continued from page 19*)

grouped to stop the invaders, calls in his staff before moving out to meet the enemy.

"Gentlemen, we are about to engage an enemy who has the advantage of tremendous numbers and an almost overwhelming tank force. The Air Force is now about to take the offensive and try to obtain local superiority for us. It will be difficult for them and we can expect numerous and vicious attacks from enemy air.

"We must stop this enemy column and keep it stalled until more units can be sent to assist us. Our wits and our weapons must make up for our inferior numbers."

As the staff officers leave, American recon cars begin speeding northward. Behind them, tanks warm-up and the infantry climbs aboard trucks. Far to the north and miles above the earth, the Air Force battles enemy jets and begins to wrestle control of the air from the invaders.

Just ahead of the fast armored cars flies a "grasshopper". An observer examines the road ahead closely, watches the surrounding forests for any signs of a possible ambush. He is an armored-cavalry officer, with considerable experience in commanding a reconnaissance-car unit. He knows what to look for and what information to radio the officer leading the column below.

A few miles behind, the tanks rumble down the road, followed by infantry trucks. A regimental staff officer flies over them in his "Cub" and controls traffic, preventing snarls and seeing that proper distance is kept between units.

The leading "Cub" banks quickly and slides lower. The observer picks up the radio and warns, "There are enemy tanks just around the curve ahead. They're moving slowly. Don't think they saw me."

The American units wheel off of the road into the trees. Three enemy light tanks roar around the curve and run into the fire of the armored cars. The first is hit, begins to burn. The others dash into the woods. Word of the contact is flashed to the rear.

A second "grasshopper" joins the first. It contains the commander of the armored unit. He scouts northward a bit, catches a glimpse of enemy medium tanks moving up through the woods. He radios his tanks to come up and take to the forest. American orders say to stop the enemy as far north as possible.

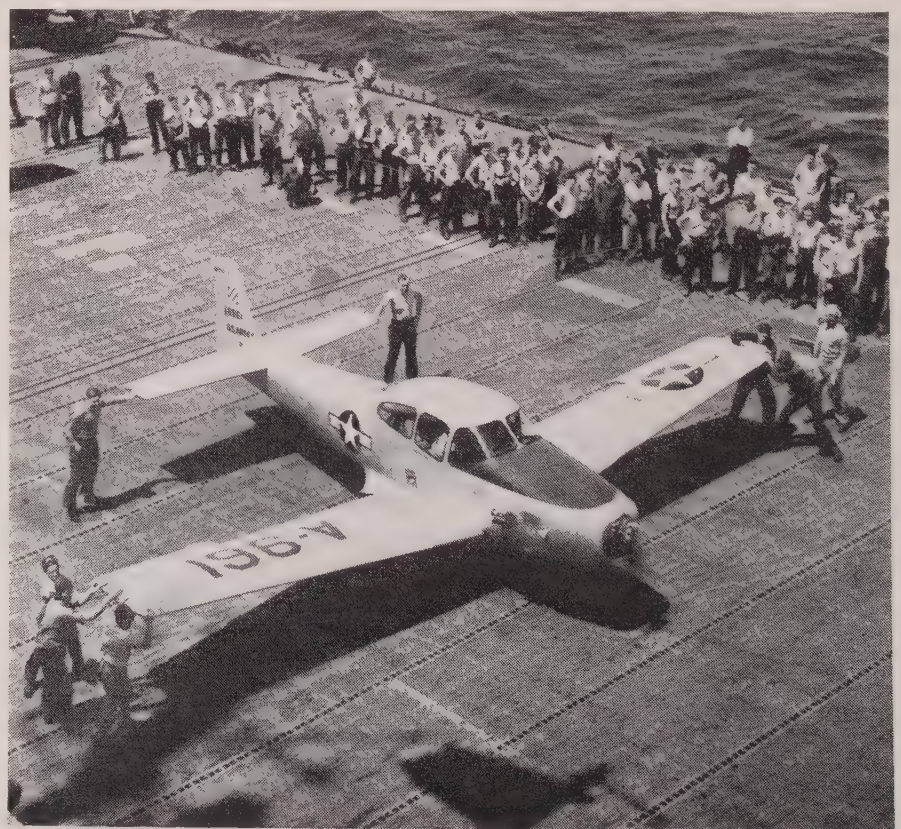
In the woods and clearing on either side of the road the armor meet. It is terrain not particularly suited to tank battle and both sides break off contact after a few hits are scored. The acrid smoke of cordite drifts through the forest and uneasy quiet settles down. It is here that a great battle must be fought.

The regimental commander, from his plane, selects a de-trucking site and arranges his battalions for action. They move up quickly, supported by more tanks. The original tank unit is in a defensive position.

Attacking swiftly, before the enemy can organize properly, the Americans drive back the small opposing force. At the entrance to a long, open valley, a halt is called.

Artillery spotting planes began examining the ground ahead. At the far end of the valley the enemy is preparing large forces for a counter-attack. The General commanding the American forces arrives in his "Cub"

U. S. ARMY *Navion* (L-17B) with Capt. W. Pauly at the controls gets set for take-off aboard the carrier *USS Leyte*. The L-17B is military liaison plane with 185E engine



and quickly sizes up the situation. He makes the decision that the enemy must be halted.

He picks up his microphone and starts the "scrambler". His words go out in a meaningless jumble to be "unscrambled" by a special machine at his headquarters. Enemy chances of hitting the right combination, and listening in, are a million to one.

He says, "Bring up B regiment and place it to the right of A. C is to be reserve. Keep Task Force Ratrace 10 miles to the rear."

In the rear, the commander of B regiment boards his plane and flies to reconnoiter the area he is to defend. The colonel of C regiment also takes an aerial view of the likely places to bivouac his men. He finds a large patch of forest that is handy to the front, provides good cover and which is reached by an old logging road.

As the troops dig-in for the expected assault, engineer planes skim over the roads to the rear, charting areas damaged by enemy bombing and noting potential materials for repair, such as fill, timber and the like. Other engineer planes circle working parties, guarding them from a surprise attack.

The Air Force is tied up completely with its air offensive, so Signal Corps planes lay emergency wire and prepare to photograph enemy positions. The little planes land on roads, bounce through rough fields, and utilize every small level patch for airfields.

Up at the front, an artillery "Cub" spots enemy tanks moving out of the woods into the valley. At the same time, enemy fighter-bombers attack the American positions. A new feature of World War III then appears —a "Cub-killer". It is a slow fighter, designed to hunt out and destroy light aircraft.

Since supersonic fighters travel far too fast to effectively get a shot at slow-moving, low-flying "grasshoppers," the enemy has found a solution. The use of light aircraft in World War II is well known, and it is to be expected that some counter be developed.

Several of the American "Cubs" go down in short order. Sleek Air Force jets arrive on the scene and promptly destroy the slow and cumbersome enemy "killers". However, a great deal of harm has been done. The artillery has lost its valuable aerial eyes. Lumbering tanks, now in view of the American lines, come under fire, but their reserve and the enemy gun emplacements remain almost unscathed.

As the tanks and American anti-tank weapons join in blazing battle, far to the rear a group of "Cubs" lift up from a field and hurry northward. Anticipating such a situation, the Army has considerable replacements ready for instant use. Back in the United States the Army is buying many commercial lightplanes and, with minor modification, they are ready for combat.

Enemy infantry now join the battle and overhead the enemy equivalent of the "Cubs" flit around American lines. Air Force jets make futile passes but there is a more potent weapon ready. Mobile anti-aircraft batteries have already dug in and are waiting. Aimed and fired by radar, they blast several enemy planes out of the air. Some escape, but they keep some distance away from the American front lines, preferring to examine the situation from over their own positions.

Under heavy assault, the Americans fall back a short distance. One group is isolated, digs in and repels constant enemy charges. Dusk is beginning to fall and fire gradually slackens. Both sides prepare to bring up fresh troops and supplies during the night.

When darkness is complete, a peculiar pot-bellied "Cub" rises from the artillery field. It drones over the enemy lines and its observer studies a small radarscope. Little pips of light on a straight line show a column of trucks or tanks moving on the highway. He quickly plots them and orders artillery fire. Throughout the whole night he works back and forth, spotting enemy tanks and guns and keeping up a constant barrage of well-directed fire.

Other "Cubs" fly in a small circle over a dark patch of woods. A flashlight gives a brief signal and they dump specially wrapped boxes toward the spot. The isolated group is getting medical supplies, food and ammunition.

During the long night new artillery batteries are placed in position. Rocket and mortar battalions dig-in and their assigned planes find fields a short distance to the rear. The "Cub" losses of the day are replaced and all is in readiness to repel the attack expected with dawn.

At the first glint of daylight the lightplanes again are in the air and calling targets back to the artillery and rocket battalions. The valley is a scene of vast movement as the enemy moves up huge masses of tanks, self-propelled artillery, and infantry. In the sky above, planes twist and snarl in desperate combat. The Air Force has superiority but it is constantly fighting to maintain it.

The "Cub-killers" appear again, but there are four jets waiting and the "killers" are driven off with losses. Unmolested, the lightplanes direct fire and offer superb observation posts for unit commanders. Tanks writhe and flash with flame as shells make direct hits. Artillery air-bursts sweep through the supporting infantry, mowing them down wholesale. The gaps are relentlessly filled and the attack moves on.

Enemy gunners notice a "Cub" skimming over the very heart of the action. As it banks, they can see it is pilotless. A plane out of range is directing its moves by special radio. This drone carries a television camera and transmitter.

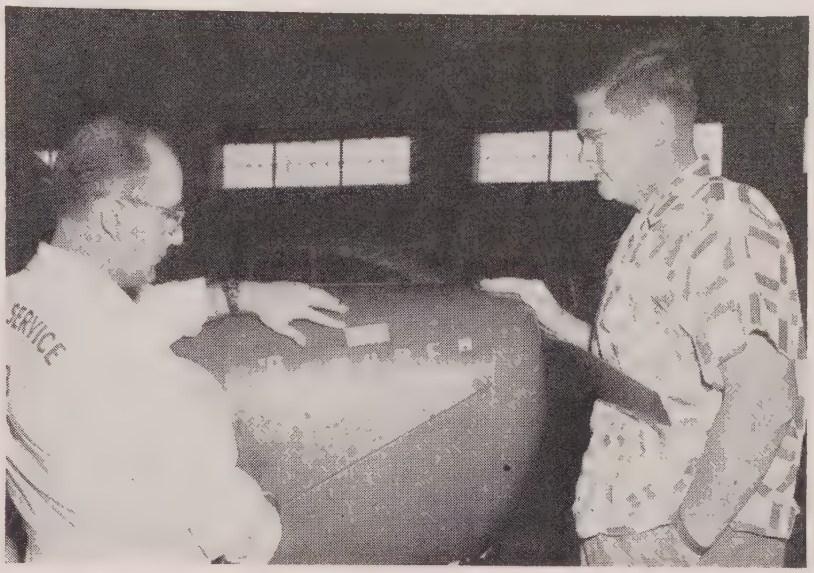
Back in headquarters the general watches each move of the battle on a television screen. With his staff officers and communications right at hand, he can make instant decisions and have them put into operation at once. Since he cannot leave his post at such a critical time, television offers him a clear accurate picture of the action, yet permits him to keep firm control of the situation.

Observers, both in the air and on the ground, are directing a terrific concentration of explosives upon the enemy. Artillery, mortar and rocket fire is assisted by strikes of fighter-bombers. The enemy gets within range of the weapons of the infantry. A blast of overwhelming fire smashes into the advancing horde. It reels and slows. Suddenly, it stops and begins to retreat.

The aerial eyes watch, ruthlessly pouring tons of steel and explosives on the survivors

(*Continued on page 40*)

WING TIP...



A placard saves a cowling. The small aluminum placard shown in this picture is riveted on the engine cowling and warns the pilot, linemen or mechanic to "Unfasten all four Dzus fasteners before opening the cowling." According to Anthony Ciano, the A&E who devised the idea and who installed placards on all airplanes operated by Pensacola's P & B Flying Service (Florida), these placards have saved many a cowling from being cracked and bent by those who seem to want to unfasten only two fasteners when checking oil or the engine. The placards cost 50 cents to install. *Bob Blatt*

Cubs for Combat

(*Continued from page 39*)

of the charge. American armor moves out, followed by the supporting troops. In the center of the valley the enemy turns and a sharp clash ends with a U.S. victory. The attack has failed and our counter-attack is driving into enemy positions.

Flying in a "Cub" just to the rear of the enemy lines, an armored cavalry observer gets a glimpse of large tank tracks. Circling cautiously, he makes out a large number of heavy tanks grouped in a half-circle. He reaches for his radio.

"There's a little party planned ahead. Heavies in half-moon formation. The medium tanks are falling back and will probably bait the trap. About two thousand yards from our lead tank."

The commanding officer of the armor hears and speaks to an Air liaison officer at his elbow. In a minute, a "Cub" takes off from a rear airfield, bearing an armored-cavalry officer and an Air Force pilot. The top of its wings are painted a bright red. It is a "Horsefly".

When it reaches the planned ambush, the pilot banks and points out the most likely spots where tanks would be hidden. The observer picks up the radio and speaks to a fighter-bomber flight just over the horizon.

"Come to the rendezvous point and watch the clearing we dive towards. Plaster the edge of the forest all around the clearing. Heavies are there in a semi-circle. I doubt if you can see them."

He then gives detailed instructions and check points. The "Horsefly" is to go back and forth over friendly front lines so that mistakes will be prevented. The fighters soon appear and easily see the red-splashed lightplane. They circle and watch it dive towards the clearing where enemy mediums stand, trying to "draw in" the U. S. armor.

One after the other the planes come in, rockets and cannon blazing. Burning and exploding tanks testify to their success. Making a series of passes until their ammunition is expended, they turn southward without loss.

During their attack, another observation plane has come forward. Far to the rear, its parent unit is preparing mammoth guided missiles for firing. After a careful study, the observer gives the word and a screaming rocket plummets into the side of the clearing. After making corrections, the rocket officer orders a concentration of fire. The giant missiles lift up whole sections of forest, tanks burst into flame, twist awkwardly, disappear in a cloud of yellowish smoke.

The fire lifts abruptly and American tanks charge around the right flank of the enemy ambush. A few of the heavies escape but most of the survivors are caught by the American tank fire. The gap in the enemy line has become a hole. The column commander brings up his reserve regiment to throw back a weak, half-hearted infantry counter-attack. As the situation is now under control, he flies over the area, noting the enemy disorganization. He makes a decision and picks up the microphone.

"Ratrace commander. Now is the time. We've got a hole you could go through sideways. Come up, full speed."

To the rear, a task force of armor and mechanized infantry speed north. They are to dive through the hole and wreak as much havoc on enemy rear units as possible. The invaders are off balance and an armored column slicing through their supply installations will keep them stumbling.

The commander of Task Force Ratrace places two of his staff in planes over the column for traffic control and he flies ahead, examining the terrain. Within minutes they are at the front and passing through the gap.

Hastily gathered enemy reserves melt like butter before an artillery barrage, followed by tanks and infantry.

There is then a sharp duel with enemy artillery, but the armor rolls over it, pauses, and re-groups. The commander finds a road branching off from the highway that eventually leads back to it. The Air Force reports a strong enemy column moving down to halt the break-through. Quickly he orders his unit to move down the side road and asks for a fighter strike to slow the advancing enemy.

Well behind the enemy lines he moves with great speed. The Air Force keeps a constant strong fighter cover overhead and the enemy gains little knowledge of his strength or intentions. An island of American power in a sea of enemy-held territory, he keeps lightplanes constantly circling the column examining the flanks and rear carefully. Vigilance is essential.

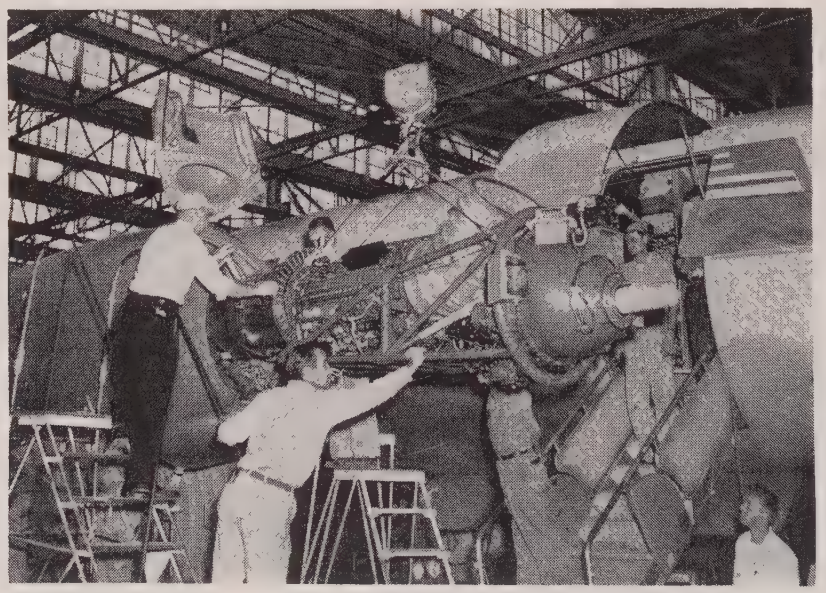
Just before sunset he goes into perimeter defense and orders complete camouflage. Dawn will bring the enemy planes who will reach the area before his fighter cover can arrive. A staff officer flies around the area, calling down points where the camouflage is insufficient.

Another plane takes an officer courier to the rear to report to the commanding general in person. It also has the mission of returning the next day with spare parts needed by several tanks. Since Air Force planes are scarce, helicopters take advantage of darkness to carry back wounded and bring up replacements.

The next day, the column captures a good-sized airstrip and the Air Force flies in gasoline and establishes an air-head. Troops are flown in from the United States and the capture is exploited to the utmost. Light aircraft fly ceaseless missions, watching every enemy move, blocking them with artillery and air strikes. Faced by this threat from the rear, the enemy falls back and the column from the south joins Ratrace again. They, with fresh reinforcements, drive the enemy back into eventual defeat.

Thus do Army aircraft operate. They are the eyes of many services, doing multiple tasks, some unheard of and undreamed of even now. During every phase of attack and defense these tiny planes will be pressed into use, will be employed constantly. An Army must have eyes, must be able to see what the enemy is doing, must see that its own components are properly utilized.

This task is difficult and dangerous, and as war grows more complex it will be even more necessary. Atomic war means the greater dispersal of troops, increasing the need for rapid communication, accurate observation and a means of close control by the unit commander. Indeed, this may be the age of the atom, but it also appears to be the age of light aircraft!



Convair Turboliner

Workmen at Consolidated Vultee Aircraft Corporation's plant at San Diego, California, are shown here installing a 2,750-hp Allison 501 turboprop engine in the first *Turboliner* on the line at Convair's plant. The engine slides easily into the nacelle tunnel on a rail at the top. Aero-Coupling fittings are used on fuel and oil lines to permit quick connections. The Convair *Turboliner,* being built for the Allison Division of General Motors Corporation, was scheduled for a first flight early in '51.

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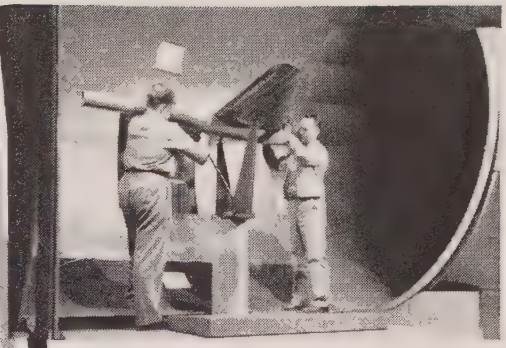

Aeronautical Engineering offers you a wide choice of creative and practical duties. Here two engineers install a guided missile model in the Northrop Aircraft, Inc. wind tunnel to study its aerodynamic characteristics.

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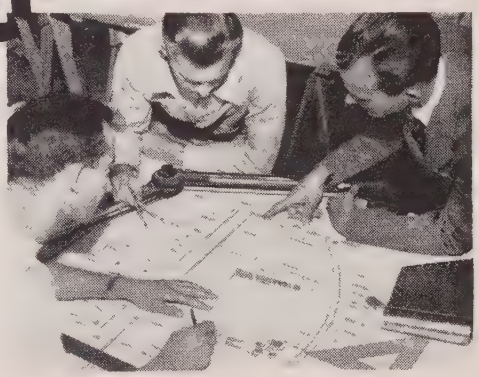
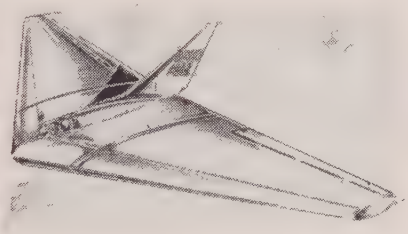


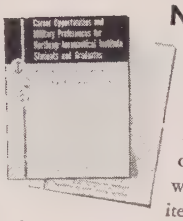
In a huddle on their design for the rudder of a student project aircraft, these Northrop students study their assembly drawings—a scene they will repeat many times during their careers.

Wing-top classroom—an example of how engineering instruction at Northrop comes vividly to life in an actual aviation industry environment.



All-wing glider designed by Northrop engineering students—a typical training project for practical design and production experience.

Career Opportunities and Military Preferences for Northrop Students and Graduates



Many young men are *not aware* of their privileges and advantages as students or graduates of Northrop, which is listed as an "Accredited Higher Institution" by the U. S. Office of Education and is so recognized by the U. S. Navy and U. S. Air Force. For example, Northrop engineering graduates are qualified educationally to become Naval Aviation Cadets, Air Force Cadets, or candidates in the Air Force Officer Candidate School. Send for complete, *up-to-the-minute* information today.

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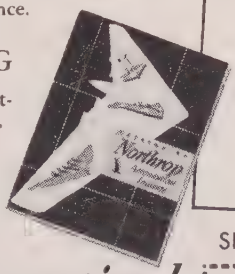

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Add Miles to Your X-C

(Continued from page 27)

save tempers, airplanes and even lives. Illustrative of this difference are two famous flights of recent times.

In 1946, the B-29, "Pacusan Dreamboat," accomplished a terrific non-refueling hop from Oahu to Cairo. Although the "Dreamboat" flew without radar and gunnery equipment, this flight stands as an example of true maximum-range technique. Literally, each mile of the course was plotted. Altitude, temperature, winds and weather were reckoned with to achieve this distance. Stuffed into the rear crew compartment were 900 pounds of fuel. "I even left behind my spare cigars," says Colonel C. S. Irvine, Airplane Commander, "in order to make more room for gasoline."

Other flights have surpassed Colonel Irvine's record. But I use this example in order that the performance of the "Dreamboat" may be compared with that of the "Lucky Lady II," the improved B-29 which completed the round-the-world hop in 1949.

When word of the globe-girdling feat came out, I was at the local airport visiting with a fellow flyer. He made a remark which nearly ended our beautiful friendship. "Brother," he said, commenting upon the luck of the "Lady," "that's real maximum-range."

I nearly cut out on both magnetos. "Friend," I said, "you've got oil in your bottom cylinders."

I thought he was going to start peeling the protective covers off his .50 calibers. "Whaddaya mean?" he asked.

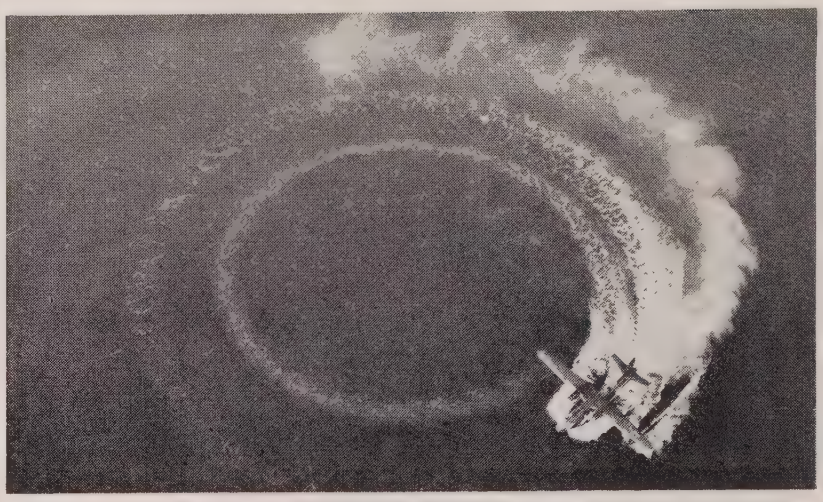
"Look," I said. "What's sensational about in-flight refueling? Spaatz and Eaker were doing it in the old "Question Mark" back in 1929." I pointed to a *Cub*. "Just keep feeding the juice to my pistons and I'll fly that J-3 to Bristol and back."

An explanation may be in order for my somewhat uncharitable attitude. Without wishing to detract from the achievement of the leather-bottomed crew of the "Lucky Lady," may I point out a few noteworthy facts? The "Lucky Lady" was a standard, combat airplane. Granted. Complete, even to the fur-lined thermos bottle. But note this: her longest leg was only slightly more than half the total mileage flown by the "Dreamboat."

As for using this round-the-world refueling technique to deliver atom bombs, why risk 14 men and a multi-million dollar airplane? The "Lady's" 5300-mile Philippines to Hawaii non-refueling step was only 15 miles longer than the late Bill Odom's Oahu to Teterboro journey in a Beech *Bonanza* which proves that a capsule-sized A-bomb could just as well be delivered in a *Bonanza* as in a B-36. But one man's opinion can be wrong. I decided to ask Captain David Parmelee, Flight Engineer aboard the "Lucky Lady," about the nature and purpose of his trip. Especially since newspapers from coast to coast were playing up the maximum-range aspects of the flight.

A nice sort of chap with a pleasant grin, Captain Parmelee said, "Frankly, we were more interested in testing in-flight refueling than in setting world distance records."

To avoid night refueling, the "Lucky Lady" made four gas-ups instead of the three which could be a tactical minimum.



SHORT TURN—The Martin XP5M-1, prototype of the Navy's *Marlin*, demonstrates its ability to make quick short-radius turns through use of its new hydroflaps

Here lies a significant difference between maximum-range and maximum-endurance flight. We assume that the "Lucky Lady's" destination was around-the-world and home again. But at no time did the crew plan the trip in terms of the total distance. Rather, the log sheet was made up on a point-to-point basis—the points in this case being the rendezvous with the tankers.

In the case of the "Dreamboat," or Bill Odom, or plain Joe Crauxcontrole who wants nothing more than to get from here to there, the total distance flown is important. The "Lucky Lady" carried ample reserves. Each leg flown was not approached with the idea of maximum fuel economy. As one member of the crew of this airplane said, "We arrived at each of our five destinations with an abundant supply of fuel in the tanks." Nor should we overlook an important military consideration. The Russians might not be so cooperative as to allow our airplanes to refuel in the daytime.

Again, the "Lucky Lady" was flown at 99 per cent efficiency. This may appear to be quibbling. But maximum-range flight calls for 100 per cent efficiency. Granted that the former condition allows for greater crew comfort and flying stability. Under combat procedures, however, 1 per cent may mean the difference between getting home and ditching. To the average cross-country pilot, anything less than maximum-range efficiency could mean a forced landing in an open field. Why then this confusion concerning the difference between maximum-range and maximum-endurance flight? Early aviation feats helped to formulate false conceptions which have endured to this day. I think of an Army record in 1923.

In that year, a DH-4B flew 37½ hours by refueling from another DH. Clearly, this was a test of engine and crew endurance.

In 1927, Lindbergh's flight consumed nearly the identical period of time. In this case, however, he stretched the minutes into miles. Still a test of engine and pilot endurance, Lindbergh's performance is usually thought of in terms of distance only.

When Admiral Byrd made his sensational flights over the polar regions, his Fokker flew tremendous distances due to the engine power-control data compiled by Charles Froesch, now Chief Engineer for Eastern Airlines. But in a sense, these latter efforts were maximum-endurance in their nature. True, maximum-range flight became possible only with the advent of the constant-speed propeller.

The constant-speed propeller enables the operator to regulate the Brake Mean Effective Pressure of his engine. Usually termed BMEP and computed in pounds per square inch, this is a major factor in maximum-range flight. Each engine has an optimum BMEP figure. In the case of the R-3350, this figure is 140. The closer the engine may be operated to this figure—without detonation—the more efficient will it run. That is, the greatest horsepower will be obtained for the least amount of fuel. By coordinating several factors, the greatest speed for the minimum gasoline consumption is possible. As previously stated, such efficiency is dependent upon the best BMEP setting. With the constant-speed propeller, this fine adjustment is feasible. Without the constant-speed prop, such control may be approximated only.

In spite of these developments, the distinction between maximum-range and maximum-endurance flight has been a long time aclearing. As recently as 1944, I was guilty of a gross error in this respect.

Stationed at our field was a squadron of Free French student pilots. With graduation approaching, this group needed additional dual night-flying time. But who likes night-flying? In small doses, it can be pleasant. Over a period of months and months, it can become something less than glamorous.

Consequently, I was determined to get my share over with in one big batch. At the same time, I decided to experiment with the "maximum-range" possibilities of my B-25.

By slow-flying the airplane, I managed to coax six hours of flight out of what was considered a four-hour fuel supply. In those days, we did our slow-flying by throttling down and reducing rpm until we were mushing along just at a safe margin above stalling speed. Adjustments were made by the airspeed alone. I had no idea what the BMEP or manifold pressure-rpm relationship should be. And I thought I was doing

some distance flying. Now I realize that I was kidding myself. I could have done the same thing without leaving the traffic pattern. Instead of coaxing miles out of the *Mitchell*, I was merely killing time.

In terms of commercial economy and military efficiency, maximum-endurance has little value. With all due credit to the patient pilots who have worn out their nerves—to say nothing of their britches—in endurance flights, few are the advantages of such stunts. After all, Simeon Stylites, the 5th century ascetic who spent 30 years sitting on top of a stone pillar, has proved the ruggedness of the human body. As to the durability of the aircraft engine, Wright Field technicians have operated a powerplant for more than 600 hours on the test block. And this without repairs or mechanical failure. I hate to be an iconoclast, but endurance flying just doesn't pay off. Distance? That's another matter. How are we going to get those miles out of our cloud-hoppers?

For purposes of simplicity, maximum-range flight may be reduced to the formula, "fuel vs. distance." I have a given amount of fuel. How may I achieve the greatest distance?

Many firms are equipping their aircraft with cruise-control charts. If you do not have one, write to the manufacturer. More and more is being done along this line. The day is not long hence, I am sure, when power and speed curves will be provided for every airplane on the market. As a private-plane owner or operator, you will be amazed at the savings in fuel and engine maintenance possible through the application of maximum-range procedures to your X-C flights.

To achieve maximum-range, airspeeds for a given weight must be predetermined and flown. Obviously, over a long period of time, this calls for a gradual reduction in power. With a constant-speed propeller, this means a continuing adjustment in BMEP. This provides for the best possible lift-drag ratio at all times. Maximum-endurance consists in flying at the lowest possible fuel consumption without stalling out. No consideration is given to distance flown in the latter flight condition.

Other factors enter the true maximum-range flight picture—altitude, air temperature, changing load, etc. These may be computed for most airplanes in order to achieve the greatest range. Usually, these factors are not important to maximum-endurance flight. As indicated above, minimum fuel consumption compatible with a safe airspeed is the primary consideration.

For a detailed study of the problem, I would recommend *Long-Range Flight*, written by Colin Hugh MacIntosh, formerly Chief Navigator for American Airlines. Based upon American's transoceanic runs, MacIntosh illustrates the fact that the airlines are interested not in "how long" but "how far."

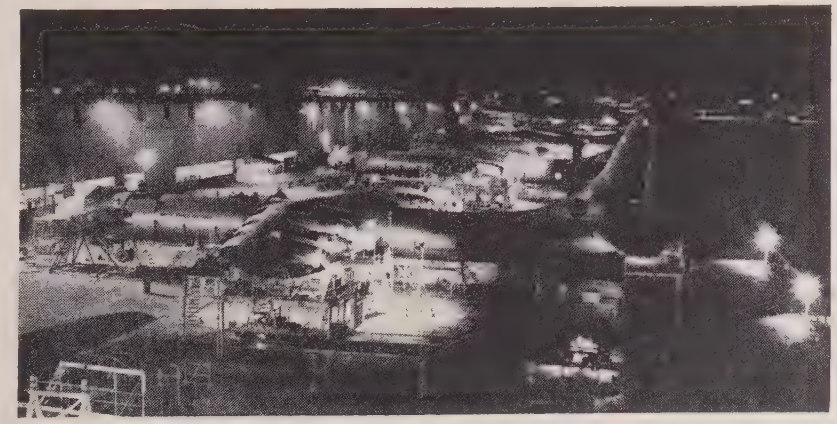
Perhaps the best illustration of maximum-range flight that I can recall occurred at Kirtland Field. Returning from a simulated bombing mission, a B-29 was preparing to land. A crack crew had determined that they were going to make of this a "sample" flight. Not a few small wagers had been made around the base as to the greatest possible distance the ship might fly.

Several "interested" spectators were gathered in the control tower sweating in the airplane. From the radio operator we learned that the crew members were "squeezing the tanks." And we could well believe it.

On the base leg, one engine cut out. The pilot feathered it and turned on the final. Letting down to the runway, a second engine cut out. The ship yawed and heaved as the pilot feathered a second time.

As the wheels touched down, the third engine quit. Kicking rudder and chopping throttles, the pilot held her steady. Then, at the end of the landing run, he cut the switches and called for the tow-tug. There wasn't enough gasoline left in that airplane to wash a mechanic's hands!

The late General Hap Arnold expressed the most clear-cut distinction I have ever heard between maximum-range and maximum endurance flight. Shortly before the end of the war, he was talking to a group of B-29 crews waiting to take off for Saipan. "Gentlemen," said the grand "old man," "you can't win a war by circling over the control tower. Your *Superforts* were built to cross oceans and continents. It's up to you to get the miles out of your airplanes. Keep your ships out of the squirrel cage and fly them dry."



NIGHT WORK—Floodlights bathe bombers during night operations at Convair where B-36B's are being modernized into four-jet-augmented (GE J-47's) B-36D's

Smoke & Flame Circuit

(*Continued from page 17*)

Weeks Law of 1911 and the Clarke-McNary Act of 1924 which strengthened it, made it possible for public and private firms to work together against their common enemy—fire. Both are convinced from their cooperative effort that airborne fire fighting and spotting pay off in forest protection.

In the Maine woods—where you've got to go by air or water if you go at all—the state's forest service is so convinced of the value of airplane forest patrol that it maintains a fleet of amphibians that regularly wing over the lake-dotted north woods.

All over the country, foresters point to cases like these:

In August, 1947, lightning sliced out of a sullen afternoon sky to start 52 fires in the far-flung ridges of the tinder-dry Potlatch Forest region of north Idaho. Two Piper *Cubs* and an Aeronca operated by Abe Bowler and two associates swarmed up from Bowler's airstrip at Orofino on the banks of the Clearwater River, 90 air-miles southeast of Spokane, Washington. The little planes guided ground-slogging fire-fighters, mapped the fire lines and buzzed vital information back to fire headquarters at the tiny Orofino strip in a matter of minutes. Within 48 hours after the first bolt of lightning seared down the trunk of a towering Idaho white pine, every single one of the 52 fires was either out or under control. Only 30 acres of timber were burned. Less than an acre per fire in an area where a year before the average fire covered 100 acres!

Down on the Little River State Forest in Alabama, rangers tried out a brand spanking new Luscombe bought for them by nearby forest industries for fire-patrol work early last spring. On the first day the rangers flew the new plane, they discovered two fires. "One of these fires would have got a 640-acre slash pine plantation," said District Forester Alvin Downing. "The other was in a 15,000-acre tract of timber. I figure the plane paid for itself that first day."

There are hundreds of cases like these, concrete examples of the timber saved by using planes for fire patrol.

So impressed by flying forest patrol are representatives of the Crosby Lumber and Manufacturing Company of Crosby, Mississippi, that they've done away with fire towers entirely in deference to fire patrol by air. C. H. Lewis, Jr., the company's forester, says it's cheaper and faster. After a year's operation with a four-place Bellanca *Cruisair Sr.*, equipped with a two-way radio, difficulties of fog-blinded towers were done away with, fire loss showed a marked reduction on 23,000 rugged acres in Amite county, and suppression costs were cut two-thirds!

The Crosby experiment was so successful that four other companies with land in the same area joined the protection plan.

Here's how it works in Amite:

As soon as the pilot of the *Cruisair* spots a fire, he buzzes back to the nearest working woodcrew and circles three times. This alerts the crew, sending them on the double to their trucks to man units on the two-way radio hookup. The airborne spotter then relays instructions by radio from the plane. Within 20 minutes these crews, fully in-

(*Continued on page 44*)

In Production

The Aero *Commander,* a new twin-engine five-to-seven-place executive plane, has been put into production at Aero Design and Engineering's Oklahoma City factory. The plane is powered by two 260-hp Lycoming engines, has speed of 200 mph at 10,000 feet, climbs at 2,000 fpm at full gross weight of 4,600 pounds, has a full-load 850-mile range.

Smoke & Flame Circuit

(*Continued from page 43*)

structed on how the blaze should be fought, can be assembled with their equipment and sent to the fire scene miles away.

Along with the new trend toward greater use of aircraft in forest-fire patrol, have come even greater developments in fire-fighting methods; and with these, better and better cooperation between all agencies interested in protecting our timber.

Just since the first of the year, for example, the 12th Air Force, with headquarters at Brooks Air Force Base, Texas, has declared itself in the forest-fire battle whenever a situation reaches "domestic emergency proportions." Brigadier General G. C. Jamison, vice commander of the Air Force, entered his armada in the war on forest fire in four states: Louisiana, Texas, Oklahoma and Arkansas. The planes and crews of the 12th are made available on call for "transportation of fire fighters from airfield to airfield, reconnaissance flights, and helicopters for rescue operations."

The helicopter is taking a constantly greater share of the forest-patrol work. This busy, versatile little craft is well-adapted for the gruelling, smoke and flame circuit where missions often are accomplished at tree-top level.

Use of the helicopter, according to Perry A. Thompson, a California regional forester, eventually may even do away with hazardous smoke jumping. Experimental use of these rotary wing ships in California proved to Thompson that they could successfullly land in clearings only a few yards wide, an all-important factor in timber country.

The smoke-jumping 'chutists are a comparatively new development in forest-fire fighting. In 1940 the Forest Service tried out this tactic with 10 men. Last year, 244 jumpers were dropped from planes on 94 fires, making, in all, 566 individual jumps. During the '49 season, Forest Service planes dropped 346,924 pounds of supplies and equipment to men fighting fire in relatively inaccessible areas.

Forest-fire fighters the country over are looking to newer and more modern methods. At a recent Forest Service conference in Lewistown, Idaho, J. W. Farrell, Boise National Forest Supervisor, spoke about "streamlined methods of fire fighting." He said smoke jumpers, helicopters and even bombardment of electrical storm clouds with dry ice pellets from planes will go a long way towards controlling disastrous timber holocausts of the future.

It's all part of a vast new field for pilots, plane designers and manufacturers. Special characteristics not required for most types of commercial or military flying sometimes pay off in forestry patrol work. Speed is not important, stability is. The plane that does best on a forest-fire patrol job is one that can operate safely at low altitudes and reduced cruising speed. Here, the helicopter is a natural. There is plenty of opportunity for new developments in special equipment, too.

Private wood-using industries, with a stake in tomorrow's as well as today's timber resources, are putting more and more money into modern aerial fire-patrol equipment.

It adds up to new challenges and new opportunities for the aviation industry—challenges that will be met.

LF Radio for VFR

(*Continued from page 29*)

in order to keep track of his position and at the same time to hear a voice transmission, he uses the setting marked "Both." All these settings refer to the radio *receiver.*

Most lightplane transmitters are set to one broadcasting frequency. All stations in the area guarding that frequency will receive the plane's broadcast or transmission. The pilot can receive only that station to which his receiver is tuned. He tunes his receiver to the station he is calling, not to make sure that that station receives him but in order that he may hear its return call.

Let's take a look at the low frequency radio range shown in illustration 1. There are four "courses" or "beams." These courses divide the range into four "quadrants." Two opposite quadrants will be "A" quadrants and the remaining two will be "N" quadrants.

While flying across or on a course or "beam" a pilot will hear a steady monotone. When flying across the quadrants he will receive either a constant "N" (–. –. –.) signal, or a constant "A" (.– .– .–) signal.

Aeronautical charts are marked to show which quadrants are "A" quadrants and which are "N" quadrants. This is done by using a heavy line on the "N" side of the course and lighter shading on the "A" side. Also, at the end of the course there will be a letter corresponding to the signal which will be received while in that quadrant.

Often the question is asked, "Can I hear all those ranges when I turn my radio on?" The answer is "No, you will hear just that station to which you are tuned."

To tune in a specific station, consult your aeronautical chart for that station's frequency. Near the range will appear a box containing the station frequency and identification letters. These letters are broadcast in Morse code every 30 seconds. You need not know Morse, however, since both letters and the code appear in the box. Tune your radio selector dial to the frequency listed for the specific station, and you will begin to receive that station.

About those identification signals. They are transmitted at 30-second intervals, first into the "N" quadrants, then into the "A" quadrants. Both signals are *not* heard unless flying "on the beam" or in the "bi-signal" zone adjacent to the beams, as shown in illustration 1.

Identification signals are very useful when static or other interference makes radio voice reception difficult. If in a clear "N" quadrant, an identification signal will be heard—then a pause. If flying in a clear "A" quadrant, the pause will come first then the identification signal.

When flying in the "bi-signal" zone of an "N" quadrant, the pilot hears first a strong identification signal, followed by a weaker identification signal. When in the "A" quadrants in a "bi-signal" zone, the pilot will hear a weak identification signal (you might think of it as filtering through from the "N" quadrant), then a strong identification signal. On the beam, both identification signals will be of equal strength, and will come over as a constant "key-down" signal.

(*Continued on page 46*)

Responsibility of Air Power

(*Continued from page 11*)

mutation—the weapons of atomic energy which are in a new dimension—we realize that the power and therefore the responsibility of modern air is an appalling thing to possess. It is appalling not only because others have this same kind of weapon but also because of the duties and responsibilities which the possession of this tremendous striking power casts upon those who have it. And who indeed can say that this is the end of the mutations? May there not be others? May not the application of atomic energy to powerplants be one of them?

The military establishments of the world, therefore, have in their hands an instrument which is bursting with power—power which can be used for the good of mankind or for his destruction. The weapons which man has have the most far-flung consequences, not only in military matters but also in the relations of states to each other and even, if we look at history, on the forms of internal political institutions of states.

We assume, of course, that we shall handle our responsibilities properly. Certainly, our intentions are good. But we must face the fact that something *more* than good intentions is required. A high degree of wisdom will be needed in the governmental actions which are taken to see to it that this new and tremendous power is properly used. It will not be easy.

The West has had an analogous experience in the past in that for long it has had control of the seas and this carried with it a great measure of responsibility to see to it that this power was used well. On the whole I think that we may say that the sea power of the West was used for increased trade and wealth and for a greater interchange of goods, persons, and ideas. And it is worth noting, too, that the great period of Naval power in the 19th Century was a time of relative peace until this peace was broken by a land power which sea power alone could not hold in check.

Now the invention of the airplane has come along to create another and more serious kind of responsibility. The invention of the airplane did not in any way diminish the vital necessity of the control of the sea lines of communication; and the air is in no way a competitor of the sea. The air has to do with another medium and is, therefore, an additional function. The defense and control of sea lanes is still indispensable to the defense of our Society. What has happened is that a new medium has been brought into the game—the medium of the air, with which man did not have to deal until the invention of the airplane. We now have two media to defend and control.

Air power has much of the characteristics of sea power. It can and does make for the interchange of people and goods and ideas. It opens up the world. It has also the defensive quality of sea power, so the air lanes of a country must be protected just as effectively as its sea approaches.

But air power has something else which is not associated with traditional naval supremacy. That is the ability to make violent attacks at the heart of an enemy's country. The air, unlike the old surface sea power, can go right into the centers and vital points of the enemy's power. The advent of the airplane has extended the effectiveness of sea power over the land and into the enemy's country to the extent that naval aircraft can penetrate. The air can concentrate its mass by bringing all its force simultaneously to focus on single targets. It can select for destruction the elements which are most needed to sustain the enemy's military effort. These main targets, within the reach of air power only, have never been penetrated in all the history of warfare until the very climax of field campaigns. And this point assumes special importance when we realize that again it is a land power which is disturbing us. Just as a land power in 1870 started what Toynbee calls the Time of Troubles in which we live, so now a land power is perpetuating and stimulating these troubles and is playing with the survival of our two societies. This power of the air against the vital centers of a land power is, therefore, a political fact of the very highest importance. Air supremacy could enable us to control the aggressive notions of a land power and even possibly to put an end to our Time of Troubles.

Air power can do great things for the good of mankind. But air power can do evil as well as good if it is in the wrong hands.

Therefore, it is a prime responsibility on our part to see to it that the Western world maintains a great and unchallengeable superiority in the air.

As long as an enforceable peace does (*Continued on page 48*)

LF Radio for VFR

(*Continued from page 44*)

A pilot can readily determine whether he is approaching or leaving a beam if, upon turning his radio on, he finds himself in a "bi-signal" zone. If the identification signals become more and more alike and the "background" hum increases, he can assume that he is approaching the beam. If the background hum fades out and the identification signals become more and more dissimilar, then he can assume he is leaving the vicinity of the beam.

To understand just what signals are heard "where," take a look at illustration 1.

Plane MIKE is receiving a "clear N" signal (–. –. –.). Every 30 seconds the pilot hears a single set of identification code letters, then a pause, then a resumption of the "N" signal. Also, the pilot assumes that he is leaving the station since his signal is fading out.

This "fade" is most easily determined when near the station. The change in signal strength is most rapid when flying "close in." The opposite of a fade is a "build" in signal strength which occurs when flying toward a station. Keeping the volume quite low will make the signal-strength changes easier to detect. If a radio has a selector for volume control marked "Manual" and "Automatic," by all means use the Manual setting when trying to work an orientation.

Also in illustration 1, plane ANGEL is flying down the beam toward the station. The pilot hears a steady "on-course" monotone, broken every 30 seconds by two identification signals of equal strength. As he continues along the beam toward the station he finds it necessary to turn his volume lower and lower as the signal strength increases or "builds."

The same illustration shows that plane CHARLIE isn't lost *if* he listens to the signals intelligently. In addition to a definite "A" signal, the pilot is receiving some background, indicating he is near a beam, and every 30 seconds identification signals can be heard—first a faint signal, then a louder one. As he flies in toward the station, the signal strength will gradually increase.

CHARLIE is pulling a boner though, especially if the visibility is at all limited. He is "driving on the wrong side of the road." Just as automobiles keep to the right-hand side of the highway, aircraft should fly the right side of the course.

Apparently ZEBRA knows this for he is flying sedately away from the station on the right-hand edge of the Southwest course. He is receiving a faint "A," all but drowned out in "background." His identification signals are much the same in strength, but all signals are gradually fading.

Besides the interpretation of signals and signal strength for getting a "position," there is a definite method of obtaining a "fix" while flying the range. Directly above the radio station is a cone of silence. Just prior to flying through the cone, a pilot will receive a "surge" in signal strength then, for a few seconds, silence. The lower a pilot flies through the cone the shorter is the duration of that silence. A "low cone" is very difficult to intercept, and is more difficult to detect than when flying through at a higher altitude.

Aside from its value in determining a pilot's position on the range, a radio takes a great deal of strain out of cross-country navigation. There are many aids along the way for the private pilot flying VFR.

To demonstrate some of the aids within the reach of the pilot flying a radio-equipped plane, note illustration 2. This traces a flight from Charles to Evansville.

The pilot files his flight plan with the communications station, line-checks his Cessna, then calls the tower, using the tower frequency noted on his chart adjacent to Charles Airport.

"Charles Tower. This is Cessna 41684. Over."

"Cessna 41684. Charles Tower. Over."

"Cessna 41684. Request taxi instructions for take-off. Over."

"Cessna 41684. Cleared to taxi. Runway three zero. Wind 10 miles. Altimeter 2998. Time check 1409. Over."

"Cessna 41684. Cleared to taxi runway three zero. Altimeter 2998. Time check 1409. Roger. Out."

It takes practice to understand rapid radio-voice transmissions, and it helps if a pilot knows what to expect for a reply. All transmissions are standardized as much as possible.

If the airport at the point of departure has no tower or if it is difficult to contact the communications station, then the flight plan can be filed after take-off at any point along the way.

When the pilot has completed his cockpit check, warm-up, and run-up, he briefly notifies the tower with "Ready for take-off." The tower then clears him for take-off.

After leaving Charles Airport the pilot almost immediately passes the Charles range station. If weather information was difficult to get, or involved a long-distance call at the airport, the pilot can at this point request weather from the range station. The station will furnish him with the weather ahead as well as local weather conditions.

On the first leg of his trip the pilot occasionally checks his position with reference to the North course of the Charles range.

As the plane nears the Amber range, the pilot tunes to the frequency of the Amber range in order to get a definite position check when passing the station. Since he passes the station within transmitting range he may want to ask for more weather information or give a position check.

A position check consists of furnishing the communications stations along the route with identification, position, type of flight plan, time and altitude. Position checks may or may not be required. If you're giving a position check, be sure to include the statement "VFR flight plan," as well as indicating whether you are flying "direct" or "via Airway—." Say it this way! "VFR flight plan. Charles to Evansville. Direct."

AIRCRAFT INDUSTRIES ASSOCIATION chart shows shipment of 213 two- to 10-place personal and executive aircraft by nine companies during the month of October

	Complete Aircraft			Manufacturer's Net Billing Price		
	Shipments			Shipments		
	TOTAL Jan-Oct	October	September	TOTAL Jan-Oct	October	September
				(thousands of dollars)		
Aeronca						
Champion 85 hp	22	--	--			
Champion 90 hp	69	3	13			
Superchief	8	--	--			
Sedan	46	4	5	360	19	48
7FC	1	--	1			
7CCM[a/]	7	--	1			
Beech						
Bonanza	374	32	37			
D-18	19	2	2	4,911	474	514
Bellanca						
Cruisair	5	N.A.	1			
Cruisemaster	47	N.A.	11	391	N.A.	91
Cessna						
140A	270	19	27			
170A	508	55	60			
190	40	5	5	4,343	486	470
195	94	15	9			
Engineering & Research						
G	18	2	3	59	7	10
Luscombe - 8-F	21	9	3	59	25	8
Mooney - M-18	45	N.A.	6	70	N.A.	11
Piper						
Cub Special	3	--	--			
Vagabond	1	--	--			
Clipper	11	--	--			
Tandem Trainer	371	10	49	2,980	150	306
Pacer	543	13	40			
Stinson	73	--	--			
L-18C[a/]	56	32	24			
Ryan - Navion	203	10	17	2,085	109	190
Taylorcraft						
Sportsman	20	1	2	43	2	5
Texas Engineering						
Swift	18	1	1			
T-35[a/]	1	--	--	82	4	4
TOTAL	2,913[b, c/]	213	317[c/]	15,448[b, c/]	1,276	1,657[c/]

a/ Military type aircraft sold to other than U.S. Military Customers b/ Includes shipments of 13 Emigh-Trojans valued at $35,000 and 6 Call Airs valued at $30,000. c/ Revised N.A. Not available

After the pilot passes the Amber range, he is in a clear "N" quadrant. While it is desirable to guard the frequency of the nearest communications station, in a small plane this is not always practicable. Lightplanes must consider the possibility of running their batteries down!

A pilot may tune in most low frequency ranges 15 minutes before or 15 minutes past the hour, for weather broadcasts. This enables planes with no transmitters or those out of transmitting range to get weather reports.

When the pilot approaches the Mills range he can get two position checks; first, when approaching the Southeast course of the Mills range as his signal changes from an 'N" to the monotone of the beam, and a little later a more definite fix can be had by checking both the Mills range and the Sanders range. When both frequencies yield the monotone of the beam, the pilot knows that he is at the intersection of the two ranges.

The last range to be heard is the Evansville range. The pilot intercepts the Southeast course of the Evansville range and follows it until the airport is sighted.

In cancelling a flight plan, it is easier to do so while still in the air, since the transmitter has more range in the air than on the ground. If a pilot cannot be certain that his flight plan cancellation has been received, he can phone the communications station after landing.

Lightplane transmitters as a rule have quite a limited range. Sometimes it seems that it would be easier to shout! The better the radio set, however, the better its transmitting ability. If a pilot fails to raise the communications station on his first try, he should wait a few minutes, then try again. There is some signal absorption in certain areas, or it may be that the antenna was not at its most efficient angle to the station. Radio has its vagaries.

After cancelling his flight plan, our pilot then tunes in the Evansville Airport Tower. Private pilots sometimes endeavor to call a control tower with their receivers tuned to a nearby range! As noted before, all stations guarding your frequency will receive your call but you can receive only that station to which your receiver is tuned. (Note: Be sure to listen before transmitting to be sure that the "party line" is clear.)

A typical transmission will run:

"Evansville Tower. This is Cessna 41684. Over."

"Cessna 41684. Evansville Tower. Over."

"Evansville Tower. Cessna 41684. Three miles south of the airport. Request landing instructions. Over."

"Cessna 41684. Three miles south of airport. Cleared to enter left-hand traffic on downwind leg. Over."

"Evansville Tower. Cessna 41684. Roger. Out."

Later the Cessna reports. "Evansville Tower. This is Cessna 41684, on downwind leg. Request further instructions. Over."

"Cessna 41684. Number three to land Runway Two-Seven: Traffic is DC-3 on final; follow *Navion* now on base leg. Wind 15. Altimeter 3001. Over."

"Cessna 41684. Roger Wilco. Out."

While still in the air, it's a good idea to look over the taxi strips and get a line on the location of the hangar, etc. After landing, the pilot gets taxiing instructions from the tower, and this "preliminary look" makes it easier to follow the tower's instructions. Always expedite taxiing and, unless specifically requested, never turn around in the middle of the runway and taxi back! The object is to keep the runway clear and traffic moving.

A radio adds immeasurably to the safety of airport traffic. Planes not equipped with radio are sometimes a source of irritation and a hazard at a busy airport.

If our pilot in illustration 2 had planned to land at a smaller airport in Evansville, he could have cancelled his flight plan by radio and then proceeded on to the airport he wished to use.

About flight plans. This is a free service to pilots and a very valuable one. They are very easy to file. Call the nearest communications station and give the communicator such information as he requests. He will want to know your time of departure, ETA (estimated time of arrival), cruising speed, amount of gas aboard, color and license number of the plane, and the radio equipment aboard (if none, the flight plan can be filed and cancelled by telephone). The communicator will also want to know the route to be flown and the frequency on which you plan to transmit.

The transmitting frequency is found on the FCC aircraft radio license in the plane—3105 kc is quite frequent, so frequent, in fact, that if another transmitting frequency is used, arrange to have a special watch on that frequency.

It is important for a pilot to remember to cancel his flight plan at the end of his flight. Where such cancellations have not been made, aerial search parties have been sent out needlessly. This is not only a waste of time and money but it could work a hardship were a real emergency to arise with all the search planes out.

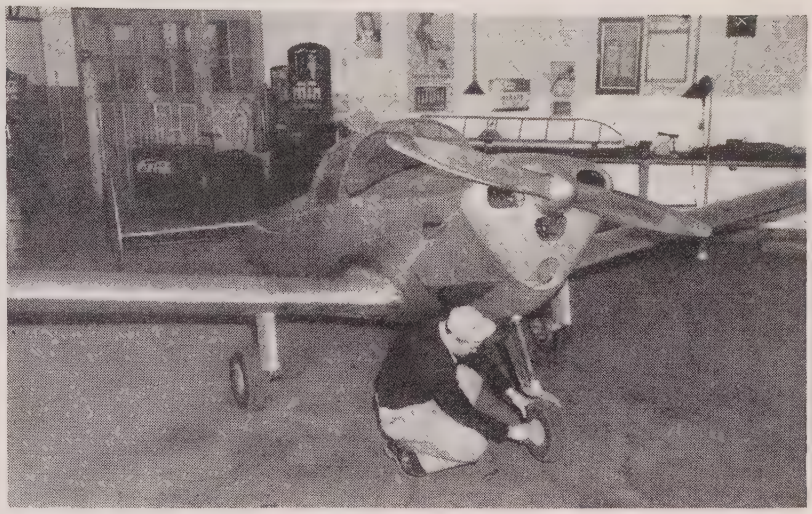
As to this rescue service, provided by CAA, within one hour after the plane's ETA the search begins. The destination station calls the station at the origin of the flight to find out if the plane returned to the home field. Then other possible airports are called, and the airlines are requested to be on the lookout along the route. Highway patrolmen and forest rangers are advised of the missing aircraft, and other planes join the search until the craft is found or the case "closed." By filing a flight plan the pilot has at his disposal plenty of skilled assistance. In short, flight plans are flight insurance.

All but unknown is another service readily available to all pilots flying radio-equipped planes. That service is the CAA communicator's listening watch on several frequencies, among them 3105 kc. Not all range stations are communication stations since some are simple navigational aids and are known as "independent ranges." This fact will turn up in the Airman's Guide in the code words BRAZ-W, MRL-W, the key is the -W which means without voice. Most of the ranges, however, are manned 24 hours each day.

A lost pilot can broadcast "blind." Communicators picking him up will reply. If more than one station receives the call, a fast teletype service will enable the station receiving him the strongest to take over. The communicators know the terrain in

(*Continued on page 56*)

WING TIP . . .



A ONE-INCH diameter ring securely anchored to the hangar floor can be used to raise the nose wheel of tricycle-gear planes so that repair and maintenance work can be done. It eliminates scratching of the metal skin caused by the practice of placing sandbags on the tails of planes to raise their nose wheels. Herb Hetto thought up this one. He chopped out small section of concrete floor, secured the iron ring in the patched concrete floor by heavy wire. A small hook in the tail tie-down ring easily engages floor ring and holds nose wheel up. *B. Blatt*

...Air Power

(*Continued from page 45*)

not exist; the Western world must see to it that it has the most powerful air arm of the world. Nothing could be worse than to have the control of the air in the hands of those who would misuse it.

This responsibility—the responsibility to be strong—will not be easy to meet. It goes against the grain for democracies to prepare adequately in peacetime. It is hard to find examples in history when the free world has prepared itself adequately in time of peace. It was easier for the sea powers to do this. Free peoples seem to have been able to accept the notion of having naval power in time of peace; but they have not done so often on land; and the air is new and we cannot be sure how it is to be with it. But side by side with the few cases where free peoples have been ready to meet the more alert and prepared aggressors are dismal failures where countries close to an aggressor allowed their defense to fall to a condition which invited attack—often fatal attack on them. And that was with the lesser weapons of yesterday, the weapons which had but a small fraction of the power to destroy of modern air power.

So far the record of our Western preparedness has been spotty. We demobilized after World War II with the hope that the lessons of the horrors of that war would produce at least a breathing period in which it was safe to disarm.

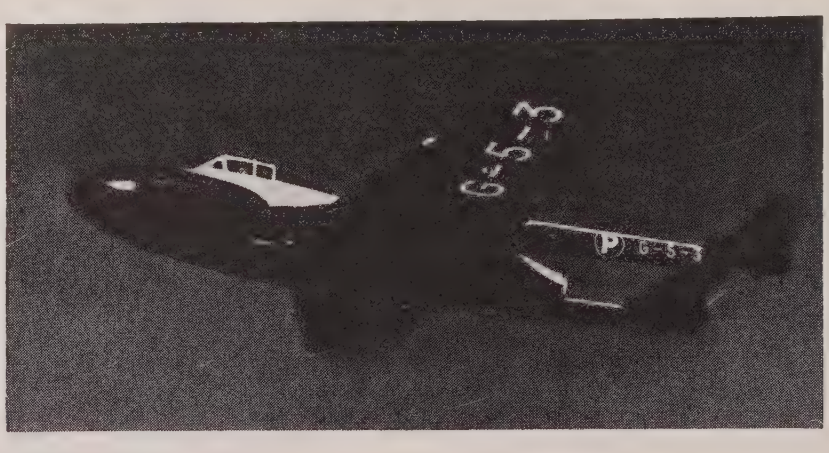
Such did not prove to be the case; and now we have realized, belatedly and with a sense of indignation, that we have to devote a large part of our resources to the production of a military force.

The West now is not adequately prepared, particularly for the defense of the continent of Europe. In some arms we have done reasonably well. For example, if I may speak of an American force, I think it can be said that our strategic air arm is superior to anything of its particular kind which now exists. I wish also to say that in my opinion it is of the very highest importance that this superiority of our strategic air be not only *maintained* but substantially *increased.*

There is, I think, an inadequate understanding of the importance of strategic air, much of which comes from the difficulty of speaking freely, because of security reasons, of our military capabilities. I must say that this reticence to speak on military matters can be overdone. For there is a counter balancing right of the people, who make these military capabilities possible and who are so vitally affected by them, to know the most that can be said which does not aid a possible enemy.

About our Strategic Air, we have at the present time in the Command a fleet of aircraft, the installations and the weapons which are capable, if anyone strikes us first, of retaliating most violently.

And may I emphasize, in order that there may be no doubt, that we are planning and shaping this strategic air purely as a deterrent and counter measure in the event that we are first attacked. We intend that this strategic air will get greater and greater power, not only in the weapons which it will have but in the speed and performance of its planes and in the installations which support those planes. This seems to me to be one spot in our over-all military establishment of the West on which we must not spare effort or cost. This strategic air arm must continue to have the most violent power available to it. I say this not because I am unaware of the dreadful disaster which it would be if ever we were called upon to use our strategic air attack. I am saying it because our ability to deliver such an attack is the greatest hope that the Communist will understand that war will be a very unprofitable business for them. In short, it is the deterrent power of this strategic air arm on which I lay such high importance. I grant you that it is a peculiar thing to seek peace by preparing for violence, but until we get a better system this strategic air arm is the best defense of Europe and the rest of the Western world which we have.



DE HAVILLAND *Venom* is one of the latest fighters on order by Great Britain's Royal Navy. A night fighter, the De Havilland *Venom* has radar in the nose, and carries a crew of two on its all-weather night attack missions

You will understand, of course, that I do not mean by this emphasis on strategic air to play down in any way the high importance of defensive air and of the tactical air which is so indispensable. But I do want to say that we must not allow an emphasis on any of these functions, or a shifting in fashion in military thinking, to becloud the indispensability of the others.

Western Society is united in a determination to protect the European continent against attack. There is in the Western world today a cohesion and a determination to stick together greater by far than has ever existed in the past. In resisting the German attack many nations of the West bound themselves together as brothers in arms and as political friends to maintain what we consider the best of the Western world. But the degree of cohesion that was made in World Wars I and II was nothing compared to that which exists today. To be sure we are not always in agreement, but for all the differences which may appear in figuring out *how* we are going to work together there is never the slightest doubt that we *will* work together.

In pursuance of this great unity—a unity which will grow greater with the years—the United States is determined to play its part, including being willing to take a share in the defense of the European continent. To do this the United States has shown its willingness to contribute ground troops and tactical air, as well as naval support and strategic air, to this purpose.

The ground troops will, as always, be in the Number One position if we should ever have to face the catastrophe of another great war on the center of civilization in Europe.

In mentioning tactical air I do not want to suggest that there is a sharp line of distinction between tactical air on the one hand and strategic air on the other. Tactical air and strategic air are merely handles which have been developed to identify different functions, each of which is indispensable and each of which fits into the over-all integrated structure of air power.

We have recently seen the Koran war, and we must be alert to learn the lessons that are to be found in Korea. But we must be careful to note the special circumstances of the Korean war and not be led into erroneous generalizations that this is the pattern for which our preparations must exclusively be made.

One thing that may possibly mislead us about the Korean war is that from the outset we had naval and air superiority with little opposition. For this reason there is a tendency to overlook the first function of tactical air which is, with all the other branches of the air, to obtain air superiority and, if possible, air control over the battlefield.

Too often we tend to generalize from the latest experience—to get ready to fight the war which is just over—and I mean now not the Korean war but the later days of World War II when Allied troops were fighting with a very high state of superiority and indeed control of the air over the fighting troops. Too much of our experience—too much for the purpose of sound judgments for the future—was at a time when our armies were fighting under an Allied dominated air. To get the right perspective we must cast our minds back to the earlier days when the German *Stukas* were free to rove almost at will over the battlefield and when the sound of an airplane to the ground troops meant that it was an enemy plane and not a friendly one.

Eventually the German bet on the *Stuka* did not pay off, for the *Stuka* was an instrument conceived by the Germans as a weapon to be used primarily as an adjunct to ground battle. The *Stuka* was designed for close support only; it could not fight effec-

tively in the air against other planes; and as soon as the Allies got going with their planes designed and developed to win the air battle, the *Stukas* stopped their roving. Then it was our troops which were free from the constant menace of air attack and it was the enemy's troops who had to take the brunt of our air. We are apt to forget these things; for our experience was mostly at a time when the Western allies *did* have this control of the air and we are apt, therefore, to assume that it is a normal state of affairs. It is very much *not* normal. It has to be fought for, and to fight for it we have to have the planes which are capable of knocking down the enemy's planes and forbidding them the ability to attack our ground troops.

We must, therefore, put prime importance on the policy of not letting the *Stuka* experience happen again. Our primary effort in the construction of tactical air must be on the principle of getting air control *first*. We must also have the types of planes which are capable of interdicting the battlefield and of closely supporting the fighting ground troops. Similarly, an effort must be made to step-up the joint training of the air arm and the troops on the ground. But we must not forget that this highly valuable activity of keeping the enemy's air off the backs of our own ground troops, of harassing the enemy's troops, attacking his targets, and denying him supplies is something which cannot be achieved unless first our side has control of the skies.

I have digressed on this somewhat technical point, but I think it is a fair illustration of what I mean when I say that the responsibility of air power—the first responsibility of air power—to be superior to all possible enemies—is not going to be achieved easily.

There is one further and all important responsibility of air power to which I will refer briefly. It is to see to it that our air power is fashioned in the way most calculated to produce the great purpose of the free world—which is to prevent war and to the greatest extent possible play its part in establishing a world of peace.

The main effort in the achievement of peace must come from the political arms of our governments, and in the main from the United Nations, but those who have to do with the military can do their part by a clear recognition of the primary objective we are seeking. In fashioning our military forces we must always have this in mind. The great purpose of these forces must be to *deter* war. We must have a strong defense of the territory of our Society, of our lines of communication, and we must also have in being that greatest deterrent force of all —unmistakable superiority in the air— which, in conjunction with the solid defense of the continent of Europe will make it clear to any aggressor that there is definitely no point in attacking us.

In this way we can create the opportunity for the kind of world peace for which we are all striving.

This again will not be an easy task. But I feel that the spirit of unity which is now burning in the free world is clear evidence that we will succeed in this great purpose and that this great civilization of which we are all members will survive the serious times in which it now stands and will go on to create the kind of world we want.

Profit by Plane

(*Continued from page 25*)

increased my vacation range . . ." Knowing the limited amount of time most physicians are able to allot themselves for personal recreation, it is easy to understand Dr. Eades' interest in and fondness for plane ownership.

Mr. and Mrs. Wade G. Loudermilk of Buckeye, Arizona, rather typify the modern couple who use a plane for business and pleasure. By using his own airplane to visit his chain of five theatres, Mr. Loudermilk is home 80 per cent more of the time than he was able to be when he had to make his visits by train or car. In a letter, Mr. Loudermilk wrote, ". . . to start with, our plane was a sore spot. Like most women, my wife was against flying. Now she not only likes the idea but joins me on many of my business trips. We have many weekends at the seashore or in the mountains, just a few minutes or hours by air, but many hours or days by auto."

Contrary to popular belief, learning to fly an airplane is not just for those of early college age. There are a number of active pilots over 80 years old, and there are thousands of both men and women pilots who are over 60. Actually, CAA surveys have proved that student pilots between the age of 50 and 55 are the safest of all, with a safety record five times better than that for students in the 20- and 25-year-old bracket.

The great majority of men and women today who are flying for business as well as pleasure are in the 35-to-55 age group. Maturity brings a sense of responsibility that is essential to good flying.

Like the car, the train or any other travel equipment (even the roller skates), the airplane is as safe and secure as the man operating it. All personal aircraft are built to the strictest CAA specifications both with respect to basic design and actual materials and construction. Before a plane can be marketed and sold, it must meet structural requirements at least four times stronger than those normally imposed in flight. Also, the airplane must meet a long list of safe-flight requirements.

Thorough inspections every 100 hours and an annual inspection assure the proper mechanical functioning of an airplane for years. In fact, there are thousands of private planes flying today with over 500,000 miles on them. If the average automobile was as safe to drive after it had that many miles on its speedometer as the airplane is to fly, there would be little need for the present-day production requirements of the automobile industry.

There are basically four types of aircraft from which a person interested in owning and flying his own plane may choose. Selection of a plane depends largely upon the individuals transportation requirements and the amount of money he has to spend on such equipment. These four types include the lowest-priced two-place models, the medium-priced four-passenger types, the high-performance four- and five-passenger models, and the twin-engine executive types.

The two-place airplane ($2500-$3500) is probably best for those who are just taking up flying. Inexpensive to operate and easy to fly, it is also particulary well suited for farm use.

These planes generally have 90-hp engines, cruise at better than 100 mph and get about 20 miles to the gallon of gas. Seating is either side-by-side or tandem. There are, of course, several higher powered, more expensive two-placers which cruise as fast as 140 mph, but most amateur pilots prefer to buy a good new or used two-place 90-hp plane for that first year of flying.

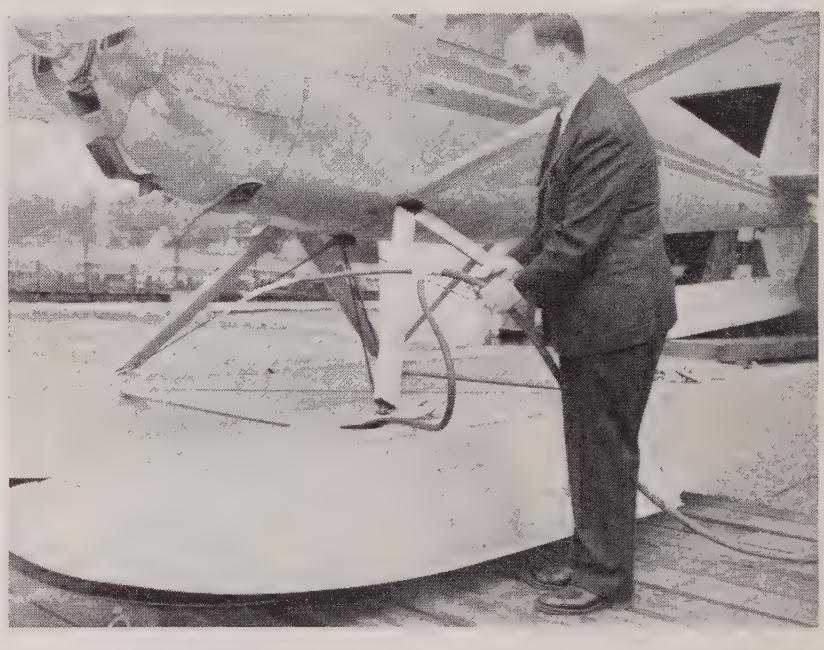
The four-passenger planes in the medium-performance class ($3500 to $6,000) are widely used for business and pleasure. These aircraft cruise at better than two miles a minute and are usually powered by 125-hp to 165-hp engines and have ranges of better than 500 miles. Many of this class airplane have provisions for the removal of rear seats for loading and air-hauling bulky cargo.

The high-performance four- and five-passenger planes ($10,000 to $15,000) offer their owners airline speed and performance. Powered by a 185-hp to 300-hp engine, this type plane cruises from 150 mph to better than 170 mph, and offers a luxuriously appointed cabin for passenger comfort. The speed and carrying capacity of this class of airplane makes possible maximum benefits arising from plane use and ownership.

The "yachts of the air" are the twin-engine aircraft. Their cost is definitely upper bracket (from $30,000 to over $100,000 depending on interior appointments, equipment, etc.),

(*Continued on page 56*)

WING TIPS . . .



Here's a new float-drain idea that will save floatplane operators hours of tedious work. It consists of a standard home washing-machine aspirator attached to a standard garden hose. The pumping action of the aspirator caused by the flow of water through the hose quickly sucks out the bilge water in the floats. Claude Dilworth, here operating the drain, claims the device helps his operation. *B. Blatt*

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2-51

Dilbert

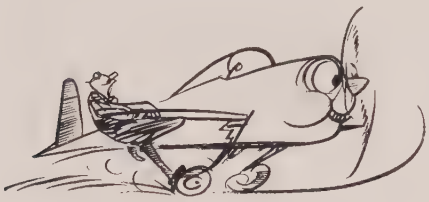
(*Continued from page 32*)

began to fade, just before his gas gave out.

He lost a wheel and crushed one wing in the forced landing. When he checked his navigation with a local farmer, he found that he was 80 miles beyond his destination.

This fiasco was so childish that it hurts to talk about it. Dilbert didn't plan his flight, he didn't check the weather, he didn't navigate, he didn't even bother to check off the prominent landmarks on his route. And then when he did get lost, he waited until he was out of gas before looking for a place to land. Small wonder this guy is the object of scorn by everybody and his brother.

Solo Flight—A student pilot landed at an outlying field, retarded throttle, set parking brakes and left his trainer unattended, with engine running, while he walked over to shoot the breeze with two other students. The little trainer looked over the situation and decided it was a swell opportunity to make a dash for freedom.

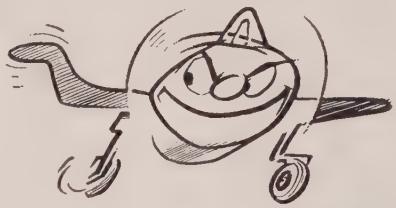


Its throttle began to creep forward, its brakes became disengaged, and it started to move. The student saw this motion and with a yell ran to his plane and grabbed a wing. But speed had increased by this time so that he was unable to do more than just hang on, causing the plane to commence a series of ever-widening circles.

Speed continued to build up until the student lost his hold and had to dodge his way to the fence for safety. Meanwhile, the

other two students had joined the chase, also leaving their planes unattended and with engines running. Think of the terrific dog fight which might have occurred had those other two little "yellow fighters" also taken it into their heads to break away. Fortunately, they didn't and the students soon returned and taxied them out of danger.

By this time the renegade trainer was feeling its oats. It dug a wing in the ground, swung around into the wind, and made a normal take-off and climb. Upon reaching an altitude of about 100 feet, it apparently



decided to make a sharp turn and zoom the field downwind. But, like so many flat-hatters before it, the trainer stalled and spun in.

Everybody thought this was a funny accident. Everybody, that is, except the authorities of the flight school who were out over five thousand bucks for a new plane. Oh yes, and the student of the plane who also was out . . . on his ear, that is.

A Challenge to Instructors—Is an instructor responsible for the accidents his student may have while flying solo? Certainly you couldn't pin anything on him legally. But there is a moral obligation which no instructor can or wishes to avoid, and that is to insure that no student of his ever has an accident due to flight ignorance or improper training.

Of course, no instructor can do a thing about a student who refuses to stay within the syllabus or follow all safety precautions. All an instructor can do is to have the satisfaction of knowing he has poured into his student everything he, the instructor, knows about flying, and that he has warned his student of all the danger spots and continuously stressed flight safety.

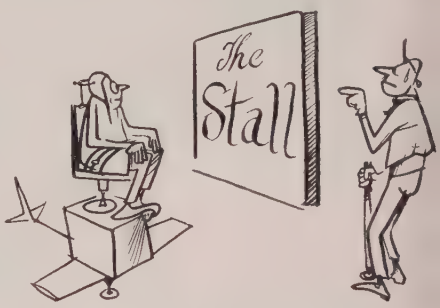
Comes then the day when the instructor, through close observation of many mental and physical reactions, knows his student *can* fly. He turns him loose. All the student has to do then is duplicate what he has done a hundred times for his instructor, the only difference being that the latter is on the ground instead of up there holding his hand.

All of which is by way of introducing a very serious subject: low-altitude *stalls*. Here are highlights on 20 of these accidents which recently came to our attention.

Each of them occurred while the pilot was *attempting to make a turn*. Nine of them resulted from stalls during landing approach and three from stalls during the first turn following take-off. The personnel involved were in all cases either students or pilots with but little flight experience. In no case was there any indication of reckless flying.

In only one case was there any emergency; a case of engine failure after take-off. The pilot attempted to turn back when there was a good landing area straight ahead. As a result of these accidents eight persons were injured, some seriously, and many thousands of dollars worth of airframes and engines were consigned to the scrap heap.

Because these accidents are so serious and because there are so many of them, something must be done about them. Because students and pilots with very limited experience are involved in the great majority of them, instructors are in the best position to take corrective action by: 1. Additional stress on the danger involved to make pilots more stall-conscious; 2. Additional training, both



theory and practice, how to avoid these stalls. For example, pilots must not only know about the higher stalling speed in turns, but also how to stay above that stalling speed at all times.

Let's all get together and give this stall danger so much publicity that we will wipe it out.

1. If you ask an airport for the correct altimeter setting and then re-set your altimeter, will it read zero when you land?

2. When running a fuel tank dry in a fuel-consumption test, what procedure should be used?

3. In an emergency parachute jump, what should be your first consideration after going over the side?

(Answers on page 56)

Cadets in Gliders

(*Continued from page 21*)

of the CAP as being the most representative of American youth and for their previous flying experience. Although the eldest of them was only 18, all had been part of the CAP, which now has an enrollment of nearly 50,000, for at least two years. The boys were:

Savery Glen Stuckey, 16, of Ruston, Louisiana. He is the son of Mr. and Mrs. Savery Lewis Stuckey. Mr. Stuckey is manager of the Municipal Airport in Ruston, and the boy currently is a junior at Ruston High.

Ronald Lee Hauck, 17, of 3454 Guilford Ave., Indianapolis, Ind., is the son of Mr. and Mrs. William E. Hauck. Mr. Hauck is president of the Rhythm Ring Company and sales service manager of Inland Container Company in Indianapolis. Ronald graduated from Shortridge High School in January, and he expects to go on to Purdue University to study aeronautics.

Glenn Tucker, 17, of East Lebanon, Maine, is the son of Mr. and Mrs. Willard O. Tucker. Mr. Tucker is a barber in Sanford, Maine, and the boy graduated from Sanford High School last June.

Galen Griffee, 18, of 621 Lake Street, Minot, North Dakota, is the son of Mr. and Mrs. Ed. Griffee. Mr. Griffee is a salesman for the Schilling Coffee Company. Galen graduated from Minot High School in June and is now attending Minot State Teachers College.

James Stockwell, 17, of Bayard, Nebraska, is the son of Mr. and Mrs. J. A. Stockwell. Mr. Stockwell is president of the First National Bank of Bayard and James is a student at Bayard High School.

The boys "won their wings" in Switzerland after at least an hour of solo glider flying and now can boast of glider pilot licenses granted by the Swiss government. Col. Dyer and Captain Wilkowski also obtained gliding licenses.

In addition to their glider training, the boys saw quite a bit of Switzerland as the guests of the Swiss government and private aero clubs. They did their flying at Lausanne and Gstaad, but also went to the capital city of Berne and to Zermatt, famed resort at the foot of the Matterhorn.

During its initial stages, the air training exchange program did not fail to come under attack from the propaganda guns of European communists. When General Spaatz made an inspection of the airfield in Lausanne from which the glider flights were to be made, a photographer pretending to be employed by a Zurich newspaper took some pictures of him on the field. The pictures turned up in Communist propaganda sheets in East Germany with the claim that American "imperialists" were taking over air bases in Switzerland. American authorities feared that the Swiss might take a dim view of a program which could lead to such an indictment by the Red press, but Swiss officials merely shrugged their shoulders. Although the Swiss government retains its traditionally neutral attitude toward the east-west struggle, the sympathies of the people are so overwhelmingly pro-American that the communist movement has made even less headway in Switzerland than in the U.S.

The Civil Air Patrol, while receiving help and encouragement from the Air Force, is a completely civilian affair and the presence of the cadets in Switzerland could not be construed as compromising Swiss neutrality. Captain Wilkowski, on detached service from the Air Force, doffed his uniform for the occasion.

The youths received their glider training from Werner Ledermann of Berne, chief inspector for gliding of the Swiss Federal Air Office, and Adolf Gehriger of Zurich, general secretary of the Swiss Air Club. The latter held the Swiss distance record for gliders of 300 kilometers (about 200 miles) until it was broken recently. He was also a member of the exchange group who went to the United States to study power flying last year.

The five American boys had their initial instruction over comparatively flat ground in the Lausanne area during the last week of July and the first week of August. Then they went to the Gstaad-Saanen for soaring instruction in the mountains. Gstaad, world renowned for its fine winter sports facilities and as a health resort in summer, is also an ideal site for gliding because of the peculiar formation of its surrounding mountains. The same west winds which bring it heavy snow in the winter sweep through the Saanenthal valley and break on Hornberg mountain to give gliders released over the mountain an even, steady "lift". Even the inexperienced American boys were able to soar back and forth over the Hornberg almost indefinitely, held aloft by the updraft. Experts, taking advantage of "thermals" or updrafts created by heat waves, can skip around from one mountain to another like children playing hopscotch.

The gliders, four of which were placed at the disposal of the Americans, were towed by small observation-type planes to an altitude of about 2,000 feet above the airport of Gstaad-Saanen, and then released. Each of the youths were able to soar for at least a half hour at a single stretch.

"I think I could have stayed up there all day if I'd wanted to," young Hauck gloated. "That's real sport, flitting around over those mountains. You soar and glide like a gull."

"Yeah, but you better not start thinking you're a sea gull and let go of that stick," Griffee replied. "You could poke your beak right into a peak."

But the boys didn't. Instead they learned the art of gliding and made mutual friends for the CAP and Americans.

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ALASKA—America's Frontier. $1.00 brings 1951 Business Directory, Large Government Map giving Up-To-Date Construction Projects, Current employment information, Homestead & Highway facts, Hunting-Fishing-Game Rules, Firms hiring & application forms, Alaska Opportunist, P. O. Box 883-SS, Hollywood 28, Calif.

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WOMAN WANTS HOUSEWORK for room, board, carfare and chance to learn airplane factory work in spare time. P. O. Box 1259, Spokane, Wash.

(*Continued on page 56*)

CLASSIFIED ADVERTISING

(*Continued from page 55*)

INSTRUMENTS

NAVIGATION INSTRUMENTS: Beautiful new and reconditioned precision instruments. Brand new Link Aircraft Sextants with case $37.50; Fairchild reconditioned $12.50; averaging type, $17.50; Bausch & Lomb Sextants, excellent condition, $49.75; Brunning Drafting Machines $55.00; Navy Stadimeters $24.00; Surveyors' Levels $175.00; Seth Thomas Classroom elect. clocks $14.35; Hamilton 24 hour Master Navigation Watches $65.00; Chelsea 24 hour jeweled clocks for airline operation, etc., $62.40; 6-inch (new) Pioneer Magnetic Compass $12.95; Pioneer panel compass (new) $17.50; Dalton Model "G" Computer (new) $7.50; Weems Mark II Plotter $2.00; Dalton E-6B computer $10.00; A-2 deluxe computer with case $3.00; American Airlines computer $5.00; Model "D" high speed $6.00; F-8 aerial cameras (new) $185.00; Astro compasses (new) $12.50; (free catalog). Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

WEATHER INSTRUMENTS. Beautiful Taylor Barometer, brass finish $18.00 and up; Temperature and Humidity Guide $7.50; Dr. Krick's handsome weather forecaster with compass, satin metal finish only $12.50; beautiful imported drawing instruments in German silver eight piece sets, plush case only $5.50. Airport set comprising wind vane, anemometer, indicators, etc. $150.00. Barometer for your office only $9.00. Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

INSTRUMENTS—Kollsman Sensitive Altimeters $12.95; Pioneer Turn and Banks $9.95; rate of climbs $6.95; cylinder head temperatures $9.95; 0-300 Airspeeds $5.95; B-16 compasses $5.95; manifold pressures $7.95; suction gauges $2.25; headsets $1.45; hand microphones $1.45. Payment with order. Gaare Supply Co., Box 277, Weatherford, Texas.

E6B Computers, new metal $7.00 E6B Manual, navigation study, $2.50. Warner Computer-Plotter, new, $3.00; plotter only $2.00 each. Flying Equipment Co., 1641-5 W. Wolfram St., Dept. S, Chicago 13, Ill.

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NAVIGATOR Rating Examinations included in New Aeronautical Navigation by Charles A. Zweng $3.00; Fairchild Surplus (electrical averager) Sextant $17.50. PILOTS supplement your training. Order "Ground Instructor" $3.00 and "Ground Instructors' Rating" $3.00 or both for $5.00; Examinations included. These books by "Zweng" prepare you for increased earning power. Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

EARN while building radios. Learn television. Experience unnecessary. Parts, tools, instructions supplied. Free details. Federal, 176-71 Union Turnpike, Flushing 9, New York.

BULLET RACEPLANE. Homebuilt, fast, economical, low-winged monoplane. Blueprints $2.00. Corbcraft, 80-S Maxwell, Rochester 11, N.Y.

MISCELLANEOUS

PHOTOGRAPHS—racing, commercial, military aircraft. Send dime for list and a sample photo. Aeronautical Photo Service, 28 William St., Orange, N. J.

YOUR Leather Jacket renovated by our craftsmen expertly, reasonably. Request free descriptive circular. Berlew Mfg. Co., Dept. 33, Freeport, N. Y.

LF Radio for VFR

(*Continued from page 47*)

their area intimately. The pilot will be asked what landmarks he observes, as well as his time of departure, headings flown, speed, etc. From this information, the communicators will "locate" the lost pilot.

Communicators all over the country, known to pilots simply as Winslow Radio, Riverside Radio, Baltimore Radio, etc., guard transmitting frequencies in the event that assistance is required.

Radar aid is available in some locations. More and more installations are being made, and many others are being planned. For example, suppose a pilot approaches the Washington (D.C.) National Airport after dark on a VFR flight plan, and discovers that his navigation lights are out. The smart thing for him to do is to call the Washington Radio and request radar surveillance. This will prevent planes he is unable to see from colliding with him. When the radarscope shows a possible collision coming up, the respective planes can be warned and given directions. Eventually all radio stations will be equipped with radar. When this comes about, the communicator will be able to find a lost pilot by just glancing at his scope.

The trusty Airman's Guide is a good plane companion. Upon consulting this, you will be pleasantly surprised to find an increasing number of new facilities available.

There are things of course that your LF set won't do. It won't pick up the hash-marked VHF ranges, fan markers, or Z-markers installed in the cone of silence. VHF requires a VHF receiver. Fan markers and Z markers require a 75-mg receiver. With these exceptions, your LF set performs all of the above services.

Navigation assistance, weather info., flight plan service, local traffic and emergency aid—all this and more is available to every pilot flying a radio-equipped ship. Indeed, your LF set will do everything but lay down and roll over for you . . . and you'll be using it for awhile yet.

DEFINITIONS

Range station	Navigational aid.
Communications station	Voice feature using the range station to broadcast a teletype system. Handles VFR flight plans.
Independent range	Range without voice feature. For navigational purposes only.
Course	Beam, Leg, or On-course.
Roger	I understand.
Wilco	I will comply.
Signal	Sounds received from the range station.
An orientation	Maneuvering so as to determine position on the range.
"Working the range"	Working an orientation procedure.

Profit by Plane

(*Continued from page 50*)

but no form of transportation can match the luxury, convenience and speed of these "yachts." Custom-styled interiors with lounges, sleeping quarters, desks and ship-to-shore radio are the last word in this "magic carpet" transportation.

Called the ultimate in personal and executive air travel, the planes that fit this category are actually personal airliners that can and do fly to any spot on earth. There is practically no limit to their utility.

Buying an airplane calls for financing, and airplanes may be financed by well-established aircraft financing firms or local banks on much the same terms and basis as automobiles are financed. Usual down payment required is one-third, with the balance payable in 12 or 18 months. Finance charges generally run around 6 per cent plus insurance.

If you are going to buy an airplane for business use, it is well to remember that the cost of operating a plane for business purposes, including depreciation at 25 per cent per annum, is considered a legitimate business expense for tax purposes. A sizeable tax saving is also realized by the fact that transportation by private or company-owned planes is not subject to the 15 per cent transportation tax.

To get the most out of your airplane, the private plane must be used intelligently and it must be integrated with other forms of transportation for effective and efficient use. For local trips the car is, of course, best. And very often the airline is fastest and the least expensive for long, direct flights, from one major city to another. The private plane, however, excels for the majority of business trips that involve a number of stops or the typical round-trip-in-one-day to distant plant or customer.

A stop at your airport, a talk with your local airport service operator and a look at the transient planes flying in and out will prove conclusively that the airplane is today an important business tool being flown by businessmen such as you or I. The airplane spells economy and growth in the business world, and for recreation and pleasure it is broadening the horizons of countless men and women who have found the ocean of the air their skyway to better living.

SAFETY QUIZ ANSWERS (page 52)

1. Not unless the airport happens to be at sea level.

2. Maintain level flight *above* 3,000 feet, watch fuel pressure gage closely, keep one hand on fuel selector valve, and shift tanks as soon as needle starts to fluctuate.

3. Be sure you are clear of the plane before pulling the rip cord.

Radar Monitoring of ILS Approaches explained and illustrated.....page 59

NAVICOM

NAVIGATION, COMMUNICATION

Lear Omniscope

ADAC Report Recommends Two-Way Radio for all Private Aircraft . . . page 60

Edited by Col. N. F. Silsbee

BOAC-Cole Report on British Airborne Radar

The British Overseas Airways Corp. has been conducting extensive flight tests in Hermes IV aircraft fitted with the E. K. Cole, Ltd. airborne radar set (see December SKYWAYS, *Navicom* section, page 64).

The airline's technical department, has issued a joint statement with Cole indicating reasonable success with the equipment. For example, it is claimed that a "reasonably experienced observer" can distinguish the fuzzy indications which show up from moderate rain from the sharply defined echoes characteristic of the dangerous cumulo-nimbus clouds which produce hail.

Airway Beacon Cuts Halted

The airway beacon discontinuance and disposal program begun by the CAA last spring has been halted. Instructions have gone out to Regional Offices to survey the need for beacons in their areas and submit findings to the CAA.

This decision is the result of widespread criticism of removal of these navigational aids. While the beacons are not required by the airlines and larger company operated aircraft, it is widely held that they are essential to personal and smaller industrial air planes which cannot afford, in terms of cost and weight, all the latest navigational equipment.

High Intensity Approach Lights Being Installed

Six installations of high intensity approach lights are now in operation, 15 are under construction and nine more have been assigned. The ones at La-Guardia, Washington National, Los Angeles and Arcata are slope-line.

The construction under way at Newark is the first trial installation meeting the recommendations of the ALPA, consisting of a single row of slope-line units on the extended runway centerline. The Westinghouse system is going in at Cleveland. All the rest are left-row ladder systems using slope-line lighting fixtures.

Cutting Antenna Drag

Antennas sticking out of a plane going 300 mph can use up as much as 90 hp of the power of the engine. A transport plane with radio receivers and transmitters, a range receiver, marker beacon receiver, glide path receiver, localizer receiver and radio altimeter has as many as 11 antennas. External antennas cut deeply into power and speed.

This is why Stanford Research Institute, Palo Alto, Calif., is trying to figure out a practical way of doing away with them. At the moment the best best appears to use a section of the plane itself as an antenna. It can be a piece of the fuselage or the tail.

Automatic Distress Signals

Thanks to an emergency keyer designed by engineers of the Air Materiel Command's Communication and Navigation Laboratory at Wright-Patterson AFB, Air Force planes in trouble will soon be able to call for help with a chain of automatic distress signals. The keyer is officially known as the AN/ARA-26 Control Keyer Group.

▶ **How It Works.** When a plane equipped with the ARA-26 gets into difficulty, the pilot merely flips a switch. The unit then automatically retunes the aircraft's radio transmitter to the emergency channel and transmits the plane's identification or call sign plus a series of SOS and radio signals that will aid ground-direction equipment in establishing his approximate location.

At present, when a pilot realizes his plane is in danger, he must notify the radio operator who in turn must tune his transmitter. This, plus actually sending the distress signal, consumes so much time that often the radio operator is unable to complete his sequence before the crash or forced landing occurs. Now, with the new emergency keyer, the distress signal sequence can be transmitted during the time the crew is getting ready for an emergency landing, and the signal is transmitted automatically and without further aid of a radio operator.

▶ **Installation.** Designed for use with any standard airborne communication transmitter as well as any transmitter now under development for future standardization, the ARA-26 is slated for installation in most USAF aircraft. It requires no shock mounting and can be installed any place that is suitable for wiring into the communication transmitter system. Including its control panel, the tiny device measures 3½ by 4 by 6 inches and weighs only 4½ pounds.

VOR Radio Facility Charts

In order to adequately chart U.S. civil airways and radio aids to navigation during the interim period when both LF and VHF aids will be in operation, the Coast and Geodetic Survey is issuing a supplementary series of RF charts.

Each series shows both the VHF and LF airways. The supplemental VOR series reverses the emphasis from the LF aids as shown on the current series to VHF aids, and indicates the LF aids by a small special symbol. Corresponding charts are punched to face one another in a ring binder.

The appropriate minimum altitudes, distances, etc. will be shown on the VOR series when such information becomes available. The new series began with the issue on October 18th of VOR RF Charts 39, 40, 47 and 49. The remainder of the series will be published as the Airspace Subcommittee of the ACC designates new airways.

NAVICOM

CAA Radar-Monitors Plane's ILS

"Radar Information for the Pilot" details CAA's method of radar monitoring of ILS

According to a recent CAA publication "Radar Information for the Pilot" (see *SKYWAYS*, January 1951, *Navicom* section, p. 54), radar monitoring of ILS approaches is normally conducted as follows:

"The inbound aircraft, if an air carrier, is expected to make an ILS approach and will be furnished radar monitoring information unless the pilot advises he does not wish the service.

"In the case of other aircraft that advise they intend to make an ILS approach, the pilot will be informed of and offered radar monitoring service. Whether monitoring service is requested or not, all aircraft making ILS approaches are observed and will be advised on the appropriate R/T channel if they get into a hazardous position.

"When the aircraft is cleared for approach, the pilot will normally be advised to listen on the voice channel of the ILS for monitoring information.

"If he is not able to read the ILS channel well enough, another frequency will be assigned if the pilot so requests. Normally this should be done prior to commencement of the approach.

"When he is about to intercept the localizer course, the pilot will be advised and can prepare for turn onto final approach as his needle centers. Similarly, when he approaches the glide path from underneath, he will be advised that he is about to intercept it.

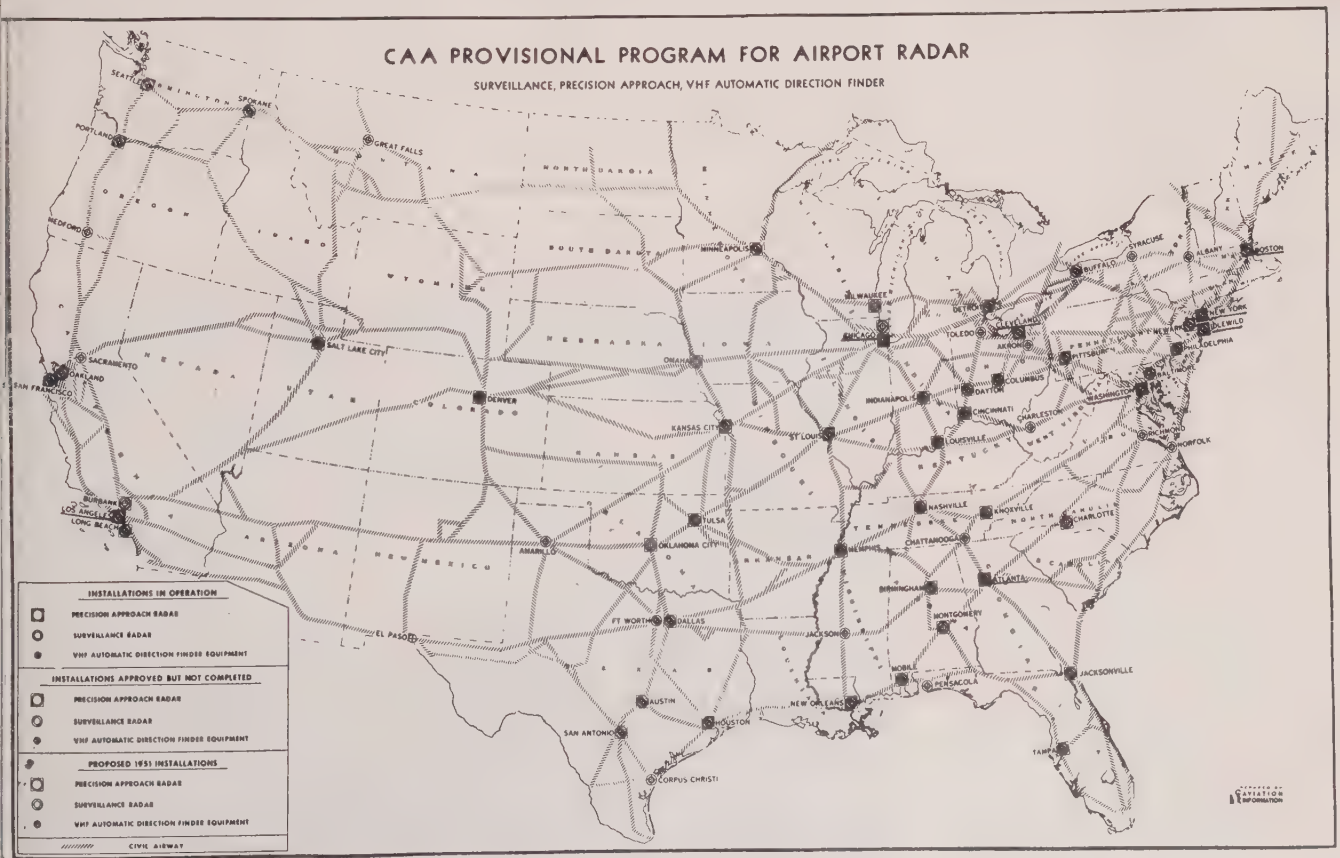
"Once established on final approach, the pilot will be told his distance from touchdown at regular intervals. Error information given depends entirely on circumstances. If a pilot is making a good approach, he is merely told his distance from touchdown periodically and that he is on course and on glide slope. Range information is often given relative to obstructions or fixes of interest to the pilot, for example: 'Over the power lines,' 'over the field boundary,' or 'over the outer marker,'" etc.

Deviation Report ▶ "In giving deviations from the glide and azimuth paths, the radar controller must exercise good judgment lest he unnecessarily distract the pilot. Thus minor deviations which the pilot can be expected to correct unassisted are combined with range information. For example, 'Five miles from touchdown, 500 feet left of course,' or 'Four miles from touchdown, still 500 feet left of course.'"

"Observed rate of correction is important to the pilot if he is to be reasonably lined up during final stage of the approach. Too fast a correction leads to oscillation and a missed approach, and too slow a correction means the touchdown point is crossed at an angle to the runway line."

"However, the radar pip and its attendant smoky trail give a perfect indication of the track the aircraft is following, and the radar controller can so advise the pilot. If the pilot is correcting normally, the controller will advise, for example: '1,000 feet left of course, correcting.' If the pilot is correcting too abruptly he will say, '1,000 feet left of course, correcting fast'; or if correcting too slowly, '1,000 feet left of course, correcting slow.' Then, when the pip reaches a point appropriate to the angle of interception of the final approach

(*Continued on page 60*)



course, the radar controller further advises, 'Approaching the course.' "

Summary ▶ "To summarize, the pilot whose ILS approach is being monitored should bear the following in mind:

1. He need not accept the service unless he wishes to.

2. Minor disagreements between the ILS cross-pointer information and radar information are possible. If the disagreement is serious, a missed approach should be executed and another type of approach requested.

3. The pilot will *not* be told how to correct his course or descent, but is only given position information. If the pilot desires to be given course and descent instructions, he should request a full GCA approach.

4. The pilot or co-pilot should continually listen to the radio channel being used by the monitoring controller.

5. Whether requested or not, the radar controller will monitor *all* front-course ILS approaches. If the pilot has indicated he does not want radar monitoring, he will be advised of the radar indications on the appropriate tower frequency only in the event emergency action is required."

At the present time this procedure applies to the eight major airports at which Gilfillan GCA, including ASR and PAR functions, is in operation. These are: Boston-Logan, NY International, LaGuardia, Washington National, Chicago, Cleveland, Atlanta and Los Angeles *(see map, page 59)*.

Allison Forms New Allison Radar Corporation

Announcement has recently been made of the formation of the Allison Radar Corporation, with offices at 11 West 42nd St., New York City, for the manufacture and sale of all Allison radar products for military and commercial markets. The new company succeeds Allison Radar Sales Corporation which formerly handled only the sales and distribution of Allison radar.

The Allison Radar Models E, ES, and ESB, which are being planned for quantity production, are the lightest weight radar equipment available to both military and commercial aviation and will contribute to air flight safety.

Miss Aline Rhonie is the President, Treasurer and Chairman of the Board of Directors of the new company.

Serving with Miss Rhonie as Officers and Members of the Board are: Donald K. Allison, Engineering Vice President, who was Chief of Engineering Division of the National Defense Research Council for 18 months during World War II, and who was also connected with Radiation Laboratory, M.I.T.; Cdr. Beckwith Havens, Llewellyn H. Bailey, and Lt. Col. Robert W. Gallaway, Vice Presidents; and Wm. O. Rockwood, Secretary.

CAA Develops Airspace Control

Mechanical Interlock system is devised for fail-safe airspace control at terminal areas during instrument weather

In the control of air traffic at terminal areas during IFR weather conditions, considerable verbal coordination is required between the Air Traffic Control Center and the Airport Traffic Control Tower in order to coordinate flight assignments and expedite the arrival and departure of aircraft.

Interphone circuits between Tower and Center have been the primary medium for exchanging information concerning aircraft vacating various altitude levels. This verbal coordination was subject to delays. It also used considerable interphone circuit time without providing either the safety of positively interlocked altitude clearances or the efficiency resulting from a clear picture of altitude occupancy. It overstrained the human element.

The CAA has developed a system which eliminates the verbal coordination by providing simultaneous indication of altitude occupancy in the terminal area in both the Tower and the Center. It is called the Mechanical Interlock, and it provides the first new traffic control medium to be installed as part of the Transition Program. The equipment is built and installed by the General Railway Signal Company of Rochester, N. Y., and is now in operation at Boston, (first installation, commissioned in 1949), LaGuardia, N. Y. International, Philadelphia, Buffalo, Pittsburgh and Los Angeles. A total of 48 installations has been authorized for fiscal '51.

The control point to which Mechanical Interlocks are being applied is the holding Fix, adjacent to an airport, from which aircraft are cleared by the Tower for landing. Aircraft approaching the airport are cleared to an altitude over this Fix by the Air Traffic Control Center. We, therefore, have a number of altitudes at this point under joint control of Center and Tower. The system can handle 10 altitudes.

The equipment consists of an arrangement of push buttons and indicator lamps on display panels at both Tower and Center. These push buttons and indicator lamps represent the various altitude levels at the holding Fix. The system functions electronically, but is activated manually.

Interlock Operation ▶ Operation is as follows: Assignment of a vacant altitude (say 8,000 feet) to an approaching aircraft by the Center is followed by pushing the appropriate button. This produces a green light at the 8,000-foot altitude on the display panel in the Center and a red light at the 8,000-foot altitude on the Tower panel. This indicates control of the arriving aircraft by the Center and further indicates to the Tower controller that the Center has assigned an aircraft to the 8,000-foot altitude, and that this altitude cannot be used by the Tower. It is "locked," and if the Tower controller were to attempt to assign an aircraft to that altitude, interlocking would make it im-

MECHANICAL INTERLOCK provides simultaneous indication of altitude occupancy in terminal area in both ATC Center and Tower. This photo shows panel lay-out in the ATC Tower

possible for him to receive the required clearance.

When the Center controller desires to release control of the aircraft to the Tower, the appropriate push button on the Center panel is activated to obtain a flashing amber light on the Tower panel. At the same time this produces a steady amber light on the Center panel, putting out its own green light and the red light on the Tower panel. The amber lights indicate that control of the aircraft at the 8,000-foot altitude is being transferred from Center to Tower.

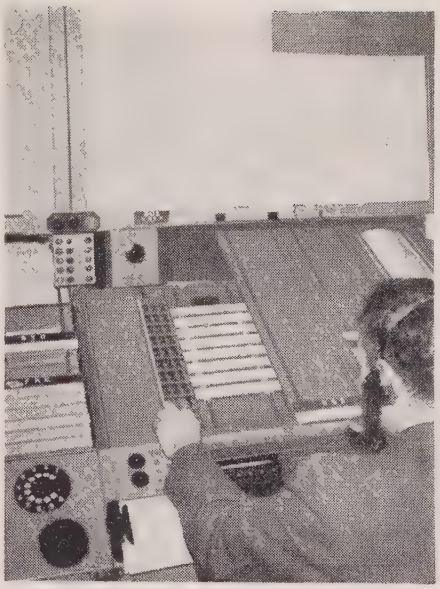
When the Tower accepts control of the aircraft, the controller pushes the proper button, producing a green light on his panel and a red light on the panel in the Center, warning the Center that 8,00-foot altitude is occupied. At the same time the amber lights on both panels go out.

As the Tower "ladders" the aircraft down towards a landing, the vacant 8,000-foot altitude is indicated on both Tower and Center panels by push button, extinguishing the green light (Tower) and red light (Center). At the same time, the "slider" *(in front of the operators)* representing this particular aircraft drops down to the 7,000-foot level, indicating that is is now operating at that altitude. It also indicates that the 8,000-foot altitude is again vacant and may be reserved for or occupied by an aircraft under the control of either Center or Tower.

The Mechanical Interlock thus provides a more rapid, accurate and positive exchange of information required for coordination of Center/Tower activities than is possible through use of interphones. It also provides safeguards against either Tower controller or Center controller directing two aircraft to the same altitude at the same holding Fix.

Development Steps ▶ According to Sam Saint, Director of ATA's Air Navigation and Traffic Control, the Mechanical Interlock was pioneered on the civil airways at LaGuardia Field. In 1946 a "breadboard" model of the Mechanical Interlock was made available to ATA for use at LaGuardia by Brig. Gen. Hayward S. ("Possum") Hansell, then C/G of the Air Transport Command, with Hq at Westover Field. Bill Parenteau and Ralph Burns did a lot of the day-to-day work on the set. Tokens were used for identity of aircraft, succeeded by the sliders. As is seen in the photos, the data was put on by hand.

To get away from this manual operation, Sam reports that an automatic identity transfer device has been developed. When an aircraft is first assigned an altitude on the Mechanical Interlock it is also given an identification number. This is given to the pilot by VHF communication and it also appears on the identity transfer unit alongside the interlock panel. As the aircraft is laddered down from altitude to altitude the identification number automatically follows.



ATC CENTER assigns altitude to approaching aircraft. This information goes to the Tower

Demonstration ▶ A few weeks ago a three-day demonstration of operating principles to be used in the Transition Program was put on at Wright-Patterson AFB by Air Coordinating Committee's Special Working Group 5 (Air Traffic Control & Navigation Panel), by Cmdr. Wuerker (USCG), chairman, and by Col. Taylor, chief, All-Weather Flying Div., USAF. A varied assortment of military, commercial, company and private-type planes from F-80's to *Bonanzas*, were flown in the tests.

It was demonstrated that 40 operations per hour (take-offs and landings) can be handled off a single runway. Sam Saint and Frank White (also of ATA) worked the Mechanical Interlock, with Automatic Identity Transfer. They have since helped to set up this equipment, and the other stuff used at the Wright-Patterson demonstration (such as the CPS-6 longe-range radar; CPN-18 terminal traffic control radar; VHF/ADF; radar beacons, etc.) at Washington National Airport for a full-scale test in routine operations.

Boeing 247 Aids Development of Better Lighting

"Adaptable Annie" is a 15-year-old Boeing 247 airplane which the CAA operates at its Indianapolis Technical Development and Evaluation Center. It is being used in a continuing program for development of more effective aircraft lighting, in which two DC-3's and an Air Force helicopter also take part.

The program produced the presently used flashing lights, and is now developing lights 500 times brighter.

ADAC Reports

Aviation Development Advisory Com. reports on U. S. Civil Air Power

The Aviation Development Advisory Committee in its report to Delos W. Rentzel, entitled "America's Civil Air Power," recommended (1) VHF as the primary air-ground communication channel; (2) utmost speed in implementing the VHF-ADF program in connection with all surveillance radar installations; and (3) that all civil aircraft owners install two-way radio while the equipment is available.

Rentzel is CAB chairman, but also chairman of the top-level Air Coordinating Committee (ACC), and has also been appointed by NSRB director Symington as chairman of a task force committee on mobilization of civil aviation in a national emergency. His full and detailed recommendations to Mr. Symington will be made within the next few weeks, and will follow the lines laid down in the ADAC report.

Plane Identification ▶ The Committee recognized that the effectiveness and speed of civil aircraft identification within "sensitive" areas will be tremendously assisted by use of VHF-ADF equipment which is actuated by the VHF radio impulses from the aircraft being contacted, causing a line of light to be drawn on the radar screen from the aircraft's pip to the center of the scope (see *SKYWAYS*, December 1950, *Navicom* section, p. 62). ADAC recommended that high priority be given to the CAA program for installing an initial number of 44 of these units *(see map on page 59)*.

Nine of these are going in the northeast section, including Boston, LaGuardia, New York International, Newark, Philadelphia, Baltimore, Washington National, Buffalo and Pittsburgh.

The North Central area gets eight: Detroit, Cleveland, Columbus, Dayton, Cincinnati, Indianapolis, Chicago and Minneapolis.

Nine more go to the South, including Louisville, Nashville, Knoxville, Memphis, Atlanta, Jacksonville, Tampa, Birmingham, Mobile and New Orleans.

The mid-West and Texas are also getting nine installations: at St. Louis, Kansas City, Tulsa, Denver, Ft. Worth, Dallas, Austin, Houston and San Antonio.

The Far West will have nine: *i.e.*, Salt Lake City, Spokane, Seattle, Portland, San Francisco, Oakland, Los Angeles and Long Beach.

In this connection the Committee directed attention to the need for "All itinerant aircraft to transmit air-to-ground on VHF channels currently assigned to them by FCC, in lieu of HF channels which heretofore provided the primary air-ground communications."

Radio Imperative ▶ ADAC further recommended that "An extensive program should be undertaken to educate all civil aircraft owners on the need and importance of installing functioning two-way radio, with particular emphasis on the fact that lack of such equipment probably would, in time of total emergency, ground non-equipped aircraft for the duration. This will also serve to encourage such additional production and distribution of this equipment during a period when manufacturing facilities and raw materials may still be available for these purposes. Utilization of the newly designated 122.8 mc private flyers' universal communication frequency (Unicom) should be included in this planning."

New Fly-Fone Ready

Fly-Fones are lightweight earphones for use with communications systems. They use some of the basic principles of the hearing aids—that is, the cordage is lightweight, the phone comparatively small, and held to the ear by a molded ear piece that slips into the outer cavity of the ear.

The original *Fly-Fone* was type certificated by the CAA (CAATC 4R2-1), and was produced in accordance with aircraft radio requirements of matching low-impedence (325 ohms at 1,000 cps) and insulation (750 volts rms).

Fly-Fones were actually designed by airline pilots searching for greater comfort and a reduction in fatigue. An important by-product is greater sensitivity which, in effect, extends the range of the radio receiver .

Sensitivity Adjustable ▶ *Fly-Fones* are roughly 10 decibels more sensitive than old-fashioned headsets, according to the manufacturer (Harding Devices Co., 4412 E. Lovers Lane, Dallas 5, Texas). This extra-sensitivity in some cases caused a loudness mis-match between one pilot using a *Fly-Fone* and his partner using old-fashioned less-sensitive earphones. Even the use of individual jack-box volume controls did not always provide sufficient control to satisfy some crew combinations whose normal hearing ability was not well matched. To give *Fly-Fone* owners a means of adjusting to this and other situations where the extra sensitivity was not required, a means of varying the sensitivity had to be developed in the new models.

AIRLINE pilots designed new earphones for greater comfort and reduction of fatigue

Because of this proven extra-sensitivity (based on tests in comparison with old-fashioned headsets of five different models used by the airlines), the CAA has agreed that the *Fly-Fone* can be permitted the use of devices that will allow a maximum attenuation variance of 10 decibels. This value has been incorporated in two arrangements featured in the latest models.

Standard Model ▶ The only changes incorporated in the new *Fly-Fones* involve cordage, plugs and the intermediate connector. The intermediate connector of the 1950 Standard Model D *Fly-Fone* contains a T-Pad made up of three resistors. When the upper cord is plugged into the pair of jack holes marked "LO," the circuit passes through T-Pad, effectively reducing the sensitivity level of the *Fly-Fone* by 10 decibels. When the cord is plugged into the pair of jack holes marked "HI," this T-Pad is bypassed permitting the use of the unit at full sensitivity.

Super Model ▶ The intermediate connector of the 1950 Super Model D *Fly-Fone* contains a resistance network in the form of a Pi-Pad with the cross member being a variable resistor. This permits volume control action of from one to 10 decibels. As in the Standard Model, the cords may be plugged into either end with similar results, for the Pi-Pad is a balanced unit presenting the same effect from either end, to both the phone and the radio.

In all of the 1950 model *Fly-Fones* a new, heavier, twisted cordage is used which should entirely eliminate the few failures that have turned up in older model cordage.

Cords now have strain-relief soft Vinylite molded guides at the plug ends to extend service life indefinitely.

Upper and lower cords are the same for both Standard or Super models. Only the intermediate connector is different, and can be used interchangeably.

New ear-pieces, to fit either left or right ear, are fully adjustable to give comfort, retentive fit. They are made of lucite with brass and phosphur bronze adjustment fittings, and may be readily worked with fine sandpaper to improve comfort with oddly shaped ear cavities.

Although designed by airline pilots, the *Fly-Fone* has been widely used by executive and private pilots.

The price of the Standard Model is $19.95 and of the Super Model $21.95.

Unicom, Portable control Tower, Announced by Lear

LEAR, Incorporated has made available the VHF Unicom transmitter-receiver LTR-5-G, a compact, portable two-way VHF voice communications system for use by fixed-base operators located at airports not now equipped with tower facilities.

The LEAR Unicom was designed to operate on the newly approved 122.8 mc private pilots' universal communications frequency. The components consist of a crystal-controlled single-channel VHF transmitter, VHF tuneable receiver, speaker, microphone, AC power supply, antenna, and 60-foot antenna cable. All except the antenna are combined in a single unit measuring only 13 inches long by 8¾ inches high by 10½ inches deep, and weighing only 24 pounds.

Installation of the Unicom involves only assembling the simple antenna and plugging the trans-receiver into a 110-volt, 60-cycle power source. Anyone with an FCC license to operate a transmitter in an airplane is qualified to operate a Unicom transmitter on the ground.

Operation is equally simple. The LEAR Unicom controls consist of an "On-Off" switch, a receiver tuning knob, a receiver volume control, and a transmit-receive button on the microphone. Flipping the switch to "On" energizes both transmitter and receiver, lighting an indicator lamp on the front panel. The unit is then ready for operation. Just tune the receiver to the desired frequency and adjust the volume to the proper level for reception of plane-to-ground communication, or press the microphone button to "transmit" and you are ready for ground-to-plane transmission.

The LTR-5-G's crystal-controlled transmitter, rated at a full two-watt output, operates on a nominal frequency of 122.8 mc and requires no adjusting. The receiver is tuneable over the 108-127 mc frequency range and incorporates a special calibration button permitting the operator to aurally calibrate the receiver at the 122.8 mc frequency.

The timely introduction of the LEAR Unicom coincides with the present CAA program of devising methods for utilization and control of personal and company aircraft during times of partial emergency or in the event of total war. The Unicom, in making radio facilities available to all airports, will be of material assistance in aiding airport operators to make their facilities a successful part of this important program.

The LEAR VHF Unicom portable control tower sells for $495 FOB Grand Rapids, plus excise and sales tax.

UNICOM operates on private pilots' freq.

Radio Contacts

During the first eight months of 1950 nearly 4.2 million radiotelephone contacts with pilots in flight were made by CAA aircraft communicators, an increase of 224 per cent over the 1949 period.

Increase in pre-flight pilot briefs, the other major service given by CAA communicators to pilots flying the 60,000 miles of U.S. airways, was from 690,590 in the first eight months of 1949 to 1,225,694 in the 1950 period.

Pre-flight information can be obtained by a pilot at any of the 469 CAA communications stations, every 75 to 100 miles along the airways, and consists of weather information, conditions of airports, radio aids, terrain and minimum safe altitudes along the route.

In-Flight Information ▶ In the air, the pilot can get current weather information from many points ahead, including his destination and possible alternates, and air conditions that would indicate turbulence or icing conditions. He can get help in navigation while in flight, and communicators on the ground will, upon request, solve navigation problems and furnish position fixes for him.

In addition, the aircraft communicator stands watch all the time over a pilot who has followed the CAA's advice and filed a flight plan. If he does not arrive at his announced destination, a search and rescue procedure is put into effect and many pilots have been located quickly, and their lives saved, through this service.

Still another service is given in emergencies in flight. During 1948, approximately 4,400 such emergencies were recorded. When that number dropped to 571 in 1949, CAA officials ascribed the reduction to the increasing use airmen are making of CAA's flight services.

In part, the increase in use of these services reflects more military flying, and more use by military pilots of the services. Military contacts for in-flight information jumped from 198,307 during January, 1950 to 332,677 in August.

Private pilots also used the services more, with 31,877 calls during January, 1950 and 76,434 in August. No breakdown of military and private pilot use of service is available for periods prior to January, 1950.

Compass Receiver for Navigation

Bendix NA-1 ADF Navigational System designed to meet all executive needs

In the NA-1 ADF Navigational Systems, Bendix Radio Division presents a highly flexible array of equipment designed to meet all requirements for automatic direction finding for airline and executive type aircraft.

The two systems, being either single or dual, include various selections of component units, all bearing CAA type certification for scheduled airline operation. Depending upon selection of components, navigational aid may be received from one ground station or from two stations simultaneously (dual ADF).

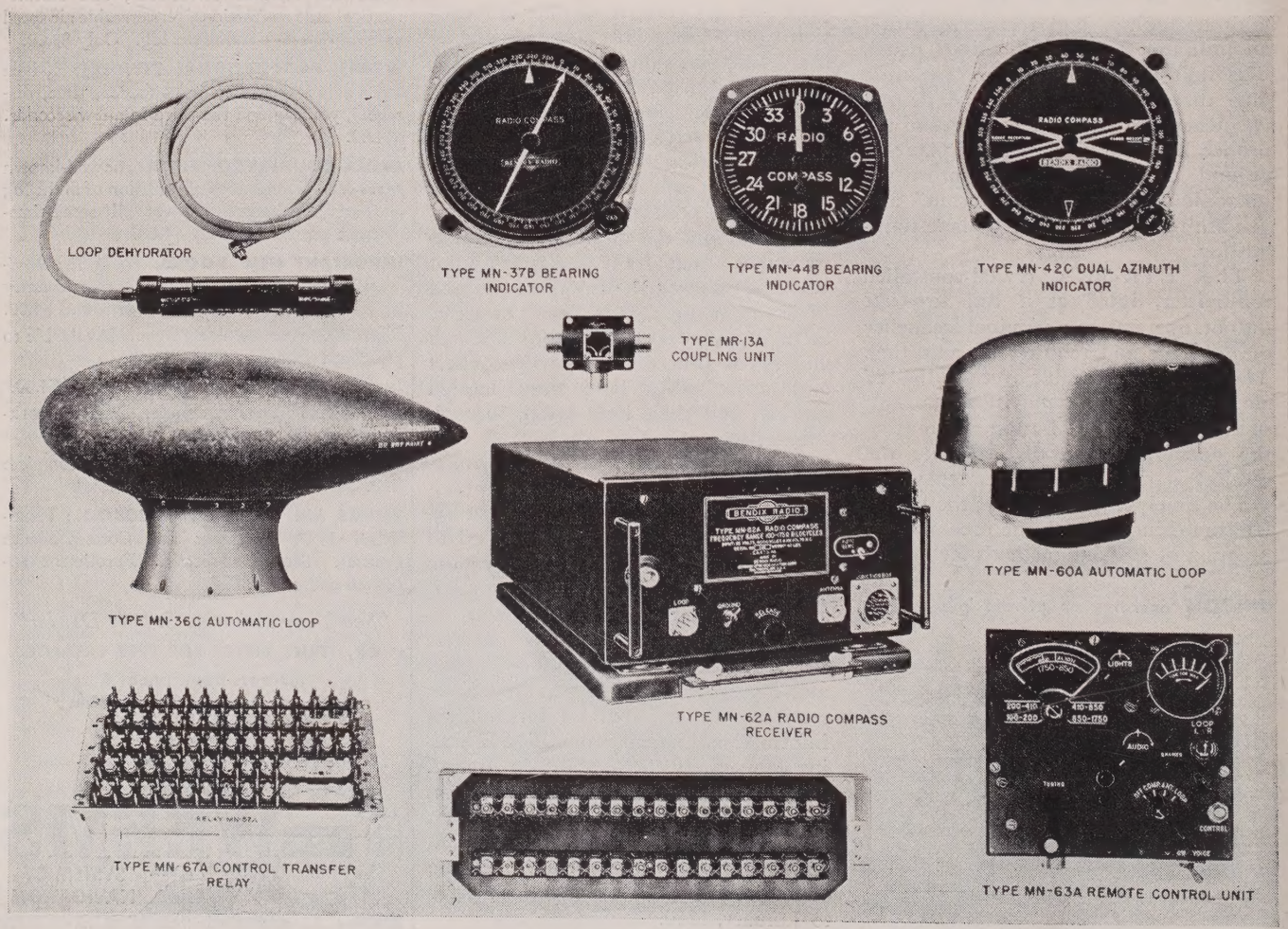
Heart of the system is the MN-62A Bendix Radio Compass Receiver. This unit is ideal for multi-engine aircraft due to its ability to operate efficiently with antenna and loop transmission lines up to 30 feet in length.

The MN-62A covers the entire frequency range of 100 kc to 1750 kc in four bands as follows: Band 1—100 kc to 200 kc; 2—200 kc to 410 kc; 3—410 kc to 850 kc; and 4—850 kc to 1750 kc. Reception of CW, MCW and VOICE signals is provided. With the additional components available, ADF operation is provided in all four bands, with visual bearing indication plus aural reception.

Operation ▶ The ADF operation may be summarized as follows: Equipment required in the aircraft includes a motor-driven loop (usually housed under aircraft belly in a streamlined plastic shielding); a sense antenna, also under belly; a tuneable receiver such as the Bendix MN-62A, RCA's AVR-21, Lear ADF-12, etc.; motor control circuits; and radio compass or azimuth indicator. Ground equipment may comprise the standard four-course L/F radio range, compass locators, broadcasting and other stations.

The receiver is manually tuned from the remote control box to the desired radio station (frequently known) and the loop is set in rotation. The transmission is received and the loop slowly continues to rotate until it is perpendicular to a direct line from the source of transmission ("null" position). The sense antenna orients the loop in respect to the aircraft's relative position to the ground station, removing the 180° ambiguity or back course reading. The loop is automatically held at null by the motor-controlled circuits. The azimuth indicator will point to the source of the transmission and show the bearing, relative to the nose of the plane. It is not necessary to home on the radio station (in which case the bearing after changing course would be 0°); the aircraft continuously and automatically takes bearing on the station regardless of its own heading.

Pilots familiar with ADF technique swear by it. The dual ADF is even better. Here everything is doubled. Each receiver is tuned to a (different) desired signal. The loops are automatically held at their respective nulls by the motor-control circuits. A dual azimuth indicator (one dial, but with two needles) shows both bearings relative to the nose of plane. Thus the aircraft homes on one station and continuously checks its position by the angle between that and the second station, the location of both being known. That's dual ADF, and from our conversations with seasoned pilots, it is going to take a bit of selling and practical experience with the new stuff in the transition program (omni-DME-course computer) before they will give it up.—N.F.S.



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RUGGED NOSE WHEEL

No "stubbing your toe" with the Tri-Pacer. Over 4000 landings and 3000 miles of gruelling taxiing—much of it on a special rough obstacle course—went into testing the Tri-Pacer's nose wheel, which is same size as main wheels. This testing is the equivalent of more than 15 years of normal use.

UTILITY with ECONOMY

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NOW THE FAMOUS PIPER PACER

WITH TRICYCLE GEAR FOR FLYING EASE

Here's the biggest news in private flying since the first Cub flew 20 years ago. Piper, leading builder of business, farm and personal planes, now brings you the sensational new Tri-Pacer, which makes flying so simple an eight-year-old girl learned to take off and land in six short lessons!

Yes, here's the Piper Pacer, famous for its speed, range, comfort and economy, now available with a rugged tricycle landing gear which makes flying easier for everyone.

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You get all this in addition to the proven features of the Piper Pacer, which make it the largest selling four-passenger plane built today...separate front and rear doors, nonflammable, longer lasting Duraclad finish, roomy cabin with added sound proofing...the incomparably reliable 125 hp Lycoming engine...and over 120 mph cruising speed. Write for brochure. Dept. K-2.

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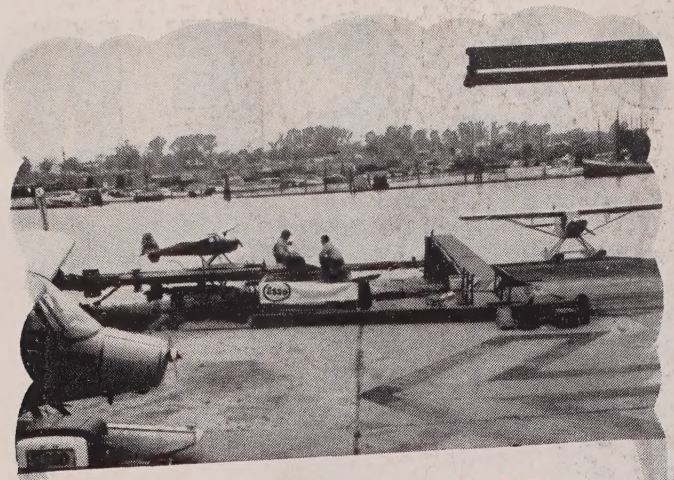

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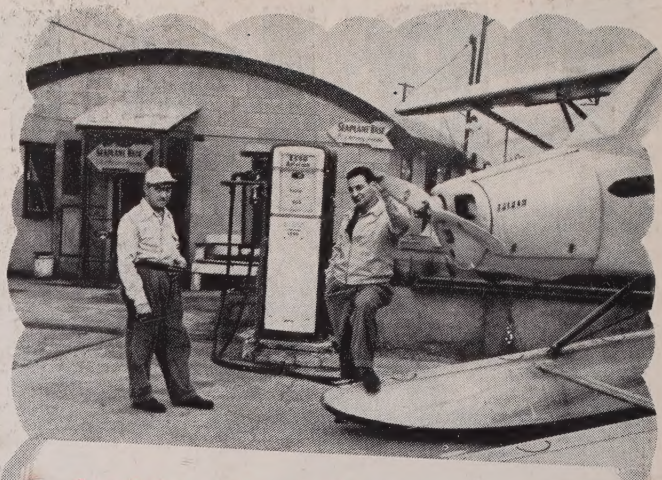

Servicing private planes

is an important part of the Skyport's operations. The active schedule supervised by President Joseph Schwarz (right) and Flight School Director Fred Miller includes instruction, aerial photography, and charter flights. All planes using this busy skyport are serviced and refueled with quality Esso Aviation Products.

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